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- Best free antivirus revealed
- 8 feature-packed suites on test

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HIGHLIGHTS THIS MONTH

Full contents overleaf

p52

REVIEW OF THE MONTH

Fairphone 6

If you turn to p38 you'll see that Fairphone won our award for Sustainability Excellence this month, but that was in recognition for all the work it has put into improving working conditions and making its phones more repairable. As it happens, this month also sees the company's first new phone in two years, with upgrades throughout – processing speed, cameras, screen quality and battery life. Naturally, it's just as repairable as the Fairphone 5 that came before it, and it comes with a five-year warranty – so much better than rivals – and eight years of software updates. The only question is, should you buy it?

p26

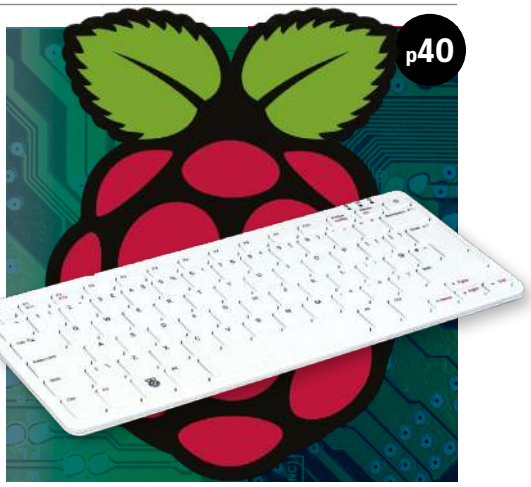
BRANDS OF THE YEAR

We take no credit when it comes to determining the best brands to buy from, because it's entirely based on feedback from thousands of readers. Find out your collective verdict from p26.

p34

PRODUCTS OF THE YEAR

We review hundreds of products each year, so a product needs something that little bit extra to stand out in each category. Our editorial team chooses its favourites from p34.



p40

DARING EXPERIMENT OF THE YEAR

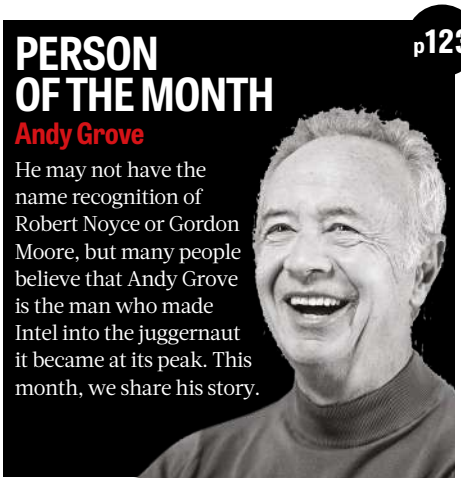
Could the world's most intolerant man tolerate switching to a Raspberry Pi-based computer for a week? Barry Collins share his very real-world experiences.

p123

PERSON OF THE MONTH

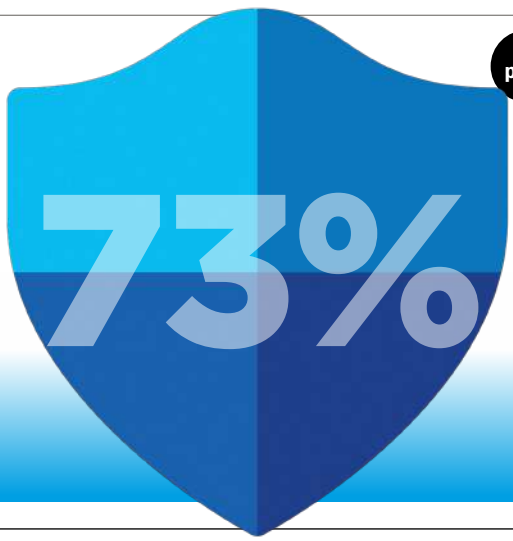
Andy Grove

He may not have the name recognition of Robert Noyce or Gordon Moore, but many people believe that Andy Grove is the man who made Intel into the juggernaut it became at its peak. This month, we share his story.



THE LABS IN ONE NUMBER

According to the latest report, 73% of Windows PCs rely on Windows Defender to secure them. After our latest group test of security suites, we suspect that number will go down.



p78

PC PRO

WHICH BRANDS SHOULD YOU BUY?
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SPECIAL AWARDS ISSUE!

p78

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- 8 feature-packed suites on test

FUTURE
ISSUE 375 DECEMBER 2025 £6.99
9 771466 382054 12

p40

Can a Raspberry Pi replace your computer?

p44

We put Word's latest features to the test!

Real World Computing

110 Jon Honeyball
The release of the new iPhone precipitates a minor shopping accident.

113 Lee Grant
Like the world and his wife, Lee has a podcast to plug – only this one happens to be good.

116 Olivia Whitcroft
The long and the short of it is that size matters in the length of a contract .

118 Davey Winder
Davey's memory isn't what it used to be, and nor is the iPhone's.

120 Steve Cassidy
Clint Eastwood – and Windows 11 – reminds Steve of the passing of time.

BELOW Jon tries out the new AirPods Pro: p74 and p110

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REGULARS

7 Editor's letter
14 The A-List
24 Readers' letters
108 Subscriptions
129 Next month
130 One last thing...

BRIEFING

10 Intel unveils Panther Lake as 18A process kicks into gear
Two landmark events lay out the path for laptops and data centres, yet the likely winners are no clearer.

11 The £99 'Obsolete Computer'
BackMarket breathes new life into Windows 10 laptops.

12 Is the AI bubble about to pop?
Fears are growing that the AI bubble might be on the brink of bursting. Barry Collins weighs up what could go wrong.

VIEWPOINTS

20 Dick Pountain
Dick digs into his grotto of retired digital artefacts to get down with Gen Z.

21 Nicole Kobie
If the AI bubble does burst, we're in for a global economic meltdown. And if it doesn't, the outlook isn't much brighter.

22 Barry Collins
Employers' outmoded attitudes to working from home are a bigger problem than stay-at-home slackers.

FEATURES

26 PC Pro Technology Excellence Awards 2025
The most trustworthy brands and the best products of the year, as chosen by readers and our team of experts.

40 Could a £100 Raspberry Pi run your office?
Barry Collins spends a week working on a £100 Pi to find out if it's capable of running everyday office tasks.

44 What's new in Word
The world's best-known word processor just keeps on gaining new capabilities. Nik Rawlinson checks out the latest features you might have missed.

48 Five things you never knew about QR codes
There's more to those little mosaics than meets the eye. Darien Graham-Smith reveals the secrets of the ubiquitous boxes.

THE NETWORK

104 The subscription trap
Subscriptions and service contracts can bleed your business dry. Steve Cassidy offers some practical advice on taking charge of recurring costs.

REVIEWS THIS MONTH

SMARTPHONES
52 Fairphone 6
68 Apple iPhone Air
70 Apple iPhone 17
71 Apple iPhone 17 Pro/Pro Max
76 Google Pixel 10 Pro Fold

LAPTOPS & CONVERTIBLES
56 Acer Swift Edge 14 AI
57 Lenovo Yoga 9i 2-in-1 Gen 10 Aura Edition
58 HP OmniBook 5 NGAI 14in (Snapdragon)

GRAPHICS CARD
60 Nvidia GeForce RTX 5050

MONITOR
62 Philips Brilliance 27E3U7903/00

SMARTWATCHES
65 Google Pixel Watch 4
72 Apple Watch Series 11
72 Apple Watch Ultra 3
73 Apple Watch SE 3

EARPHONES
74 Apple AirPods Pro 3

SECURITY SUITES
84 Avast Ultimate
85 Avira Prime
86 Bitdefender Total Security
87 Eset Home Security Ultimate
88 F-Secure Total
89 McAfee+ Ultimate
90 Norton 360 Deluxe
91 Trend Micro Maximum Security

ENDPOINT PROTECTION
98 ManageEngine Endpoint Central
99 Sophos Central Intercept X Advanced
100 WatchGuard EPDR
101 WithSecure Elements Endpoint Security

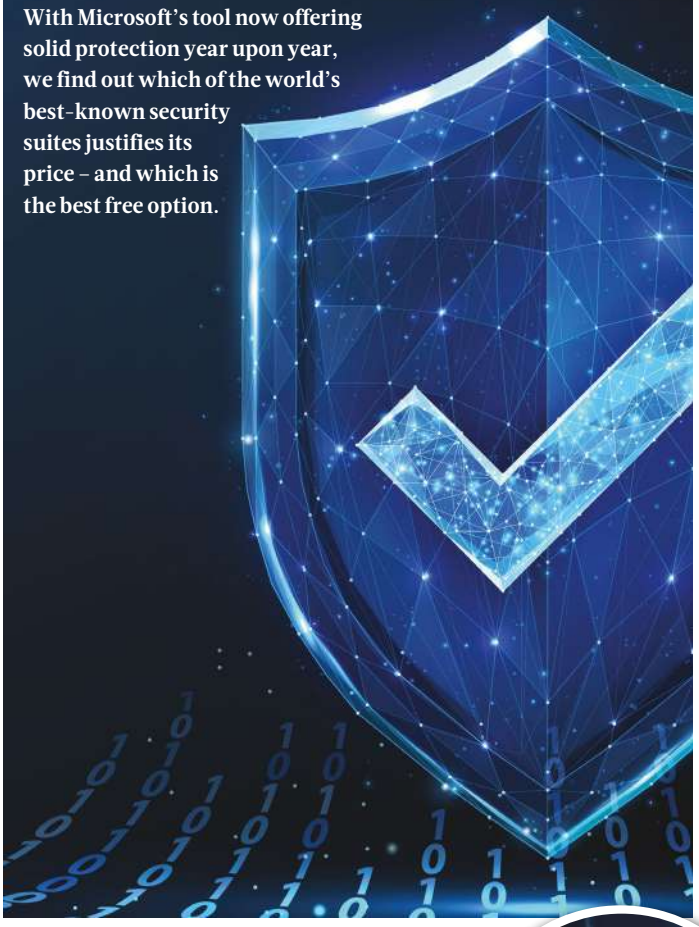
p64
The new iPhone has arrived – and this year's redesign is the most radical yet

LABS

MICROSOFT DEFENDER VS THE WORLD'S BEST SECURITY SUITES

p78

With Microsoft's tool now offering solid protection year upon year, we find out which of the world's best-known security suites justifies its price – and which is the best free option.



Buyer's guide

96 Protect your endpoints
Your defences are only as strong as your weakest link. Dave Mitchell reviews four products that will protect your client devices.

Retro

123 Andy Grove: the man who transformed Intel
David Crookes profiles a man often overlooked when discussing history's most influential people in tech.

Futures

126 Can humanoid robots really work?
It's boom time for humanoid robots, even if they aren't doing much more than moving boxes at the moment. Nicole Kobie introduces five of the machines that want to take our jobs.

Windows 11

GEFORCE RTX
Powering Advanced AI

GAME PASS

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Is that spam in your folder or are you just pleased to cc me?

Okay, settle down everyone. First up, I want to say a big, big thanks for coming to this spam and phishing convention. We really value your time, and if you could pop your bank account details into the online form, along with all your personal details and recent passwords, that would be great.

No, but joking aside lads, we're here today to talk about spam, phishing and deceiving the public. Now, I know you've had some success stories, but boys you need to step up your game. Let me share.

"Dear Customer," reads the email – yes, I kid you not, not even a first name extracted from the email address! Must do better, guys. "Dear Customer, We are unable to deliver your parcel GB9273467280 because your delivery address is incorrect or not complete, you need to update your delivery address and pay a fee of 1.27 GBP to process your parcel delivery."

I hear some laughing at the back, but come on! You really want someone to hand over their details on a link that says "https://tnssglobal.com/.well-known/gb". It doesn't even include DPD in the URL, you jokers! Finally, let's look at the grammar. A single sentence that runs on forever, says "GBP" for heaven's sake. Haven't you heard of ChatGPT?

But you know the real crying shame? The thing that should make you all hang your heads? That this message was so awful, so clumsy, that it got caught in Outlook's spam filter. Let me repeat that: Outlook's spam filter!

Now, let's switch gears, because I do want to send a big thank you to Microsoft for its help. I know we can't list you as a sponsor of the event for so-called legal reasons, but we know the truth, right? Right.

I mean, if Microsoft had really tried all those years ago then spam wouldn't even be a thing, am I right? I especially want to thank it for ignoring all the new technology out there that could improve spam filtering, because if AI can create realistic photos then it can spot a dodgy email, right?

And while it doesn't make any difference to us, big shout out to Microsoft for your sense of humour when it comes to pushing real emails into the spam folder. Brilliant! Forcing people to keep checking their spam folder – in 2025, let's remember – for the genuine stuff or they'll miss job offers, crucial emails from customers, even proper emails from their bank! I mean, lolz.

But even that is nothing compared to the great big swizz that the industry has perpetrated on the public since the first piece of spam in 1978. That, I need hardly tell you lot, is said to be from DEC salesman Gary Theurk who mass emailed an ARPANET group about the all-new DECSYSTEM-20 and made $13 million in sales. Big shout-out to Gary, you ledge!

I mean, just imagine if the big tech companies had taken spam seriously and built protections into protocols from the very beginning? Rather than the ridiculous back-to-front measures of DMARC – stands for domain-based message authentication, reporting and conformance, as you all know – that places the responsibility on domain owners. Brilliant!

Anyway, great few days of sessions ahead of us. My favourite: how to stop people installing security suites. Although I happen to know those gits at *PC Pro* have got a feature about that in the new issue. Let's hope no-one reads it, eh?

Tim Danton
Editor-in-chief

CONTRIBUTORS

KG Orphanides
One person who definitely has their security settings sewn up tight is KG, who puts eight suites to the test and sees if it's time to replace Windows Defender. See p78

Barry Collins
Could the Raspberry Pi-powered system survive a week in Barry's office in place of his normal MacBook Pro? Cross your fingers and find out from p40

Jon Honeyball
To accompany our reviews of all the new iPhones from p68, we asked Jon for his verdict on the AirPods Pro 3 earphones. Find out if they live up to his high expectations on p74

Nicole Kobie
They say we're all going to be replaced by AI and robots in the coming years, so Nicole looks her future workplace rivals in the eye in Futures from p126

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We have our reader-voted awards based on customer satisfaction this month (see p26), but if you were to call out one organisation for praise this year who would it be and why?

"Has to be Google for making really useful features – OCR, Lens, screen and text search – into shortcuts on the Search key in ChromeOS v140."

"I've been impressed by how easy it is to return things to Amazon these days. I can kick off a return with about three taps on my phone, then I take it to my local post office – no need to package it up – and show them a QR code in the Amazon app. They scan the code and take the item off me, and the refund is in my Amazon account before I've made it out of the shop."

"I'd slap Lebara on the back. I made a mistake when ordering a new SIM, accidentally replacing my existing plan instead of ordering afresh. Proper, human telephone support fixed the issue within minutes, which is miles better than the 'your call is important to us' treatment I'm used to from the major networks."

"Plusnet, even though I'm no longer a customer. I switched my broadband provider over summer, having been with Plusnet for about 20 years. First time I've had tech problems with my new service was this weekend and the support fell far short of what I'd got used to with Plusnet. I may switch back at the end of my contract."

"OpenAI for ChatGPT – in particular for selling us something we didn't know we needed."

"I would like to praise Microsoft and congratulate them on winning the 2025 'Bastards of the Year' award, noting the judges' special commendation for 'a single act of preventable environmental vandalism not seen since Thomas Midgley Jr added tetraethyl lead to gasoline'. Well done to all."

"Ubiquiti. An ongoing wave of well-specified, well-implemented products. And no subscriptions."

"Proton – for continuing to really take my privacy and security seriously."

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Intel unveils Panther Lake as 18A process kicks into gear

Two landmark events lay out the path for laptops and data centres, yet the likely winners are no clearer than before

Which chip will be inside your next laptop? Three companies are fighting for that position, with landmark announcements from Intel and Qualcomm in early October. Intel unveiled its next-generation "Panther Lake" CPUs, while Qualcomm announced the second generation of its Snapdragon Elite processors – called, predictably, X2 Elite. Both chips are likely to appear in laptops in early 2026.

Intel's Tech Tour US event was dominated by the 18A process that Panther Lake is built on, marking the first time Intel has dipped below two nanometres. The 18 stands for 1.8 nanometres, which is only enough space for around five atoms to sit side by side. Intel claimed that Panther Lake chips are already in production at Fab 52 in Arizona and its R&D fab in Oregon, with early samples in the hands of partners. And it was confident enough to show *PC Pro* around Fab 52 in Arizona, albeit on a whistlestop tour.

"Intel is doing all the right things but that does not mean success comes easy," said Phil Solis, research director for client processors, accelerators and connectivity at IDC. "One major sign of confidence for Intel's 18A process is that it secured business for Microsoft's Maia2 AI accelerator for its Azure platform in data centres – and these are large dies."

Panther Lake unveiled

After dropping many hints during 2025, Intel used the Tech Tour to finally provide full technical details of Panther Lake. These will be known as the Intel Core Ultra Series 3 and will come in three main forms: 8-core, like Lunar Lake (the Core Ultra 200V series); 16-core, with up to four Xe graphics cores; and 16-core, with up to 12 Xe3 graphics cores.

From the demos we saw in Arizona, there are reasons for Intel to feel confident about its new GPU when it comes to power-efficient gaming. Together with Intel's XeSS 2 upscaling and frame-generation technology, Intel promises smooth frame rates in even tough AAA games. However, frame generation remains controversial – particularly for first-person shooters – so we'll wait to see what the real-world experience is actually like.

ABOVE Panther Lake is built on a 1.8 nanometre process

Each Xe3 graphics core provides 10 TOPS of image generation power, which means the top-end Panther Lake chip will provide 120 TOPS from the GPU alone. And, for the first time, Intel's entire generation of mobile CPUs will include an NPU powerful enough to meet Microsoft's Copilot+ PC criteria. Called the Intel NPU 5, it provides a minor bump in power compared to the NPU in the 200V series: up to 50 TOPS rather than up to 45 TOPS. That's some way behind the 80 TOPS in Qualcomm's second-generation chip, but Intel is focusing on the superior AI power of its GPU.

Panther Lake also includes more powerful, and power-efficient, cores. The eight-core version includes four P-cores using the new Cougar Cove

ABOVE Intel CEO Lip-Bu Tan is confident the new chips will revitalise the company

architecture and four low-power E-cores based on Intel's also-new Darkmont architecture. The 16-core version adds eight E-cores, so again using Darkmont.

The improved performance per watt stems from the 18A process, but arguably the most dramatic benefactor of this is Intel's Xeon 6+ range, codenamed Clearwater Forest and also announced at the Tech Tour. This includes up to 288 Darkmont E-cores; the Xeon 6 maxed out at 144.

Qualcomm on a mission

Qualcomm is quite clear about its ambitions: it wants to steal an oddly specific 12% of the market away from AMD and Intel, with its big sell being battery life. "[The] number one reason someone's choosing Snapdragon over Intel or Apple when they're buying a new PC is battery life, as simple as that, right?" said Don McGuire, Qualcomm's chief marketing officer. "It's a huge pain point. It's the number one pain point when you talk about people."

McGuire also admitted that Qualcomm's original messaging around AI and Copilot+ PCs fell flat. "We experimented with the AI story when we first launched with Microsoft, and it just didn't work... Did not resonate, was too ambiguous. No-one really knew what it meant... So we pivoted [to battery life], and then we saw sales going the right direction."

If Qualcomm is to achieve its 12% target, then it needs to be in commercial laptops. This is where its other big announcement came in: Qualcomm Guardian, a system built into the new chips that allows IT teams (as well as individuals) to locate and remotely wipe a device if it's lost or stolen.

"Qualcomm's Guardian technology is an excellent addition to its PC SoCs that will help it make better inroads into PCs targeted to the enterprise space," said IDC's Solis. "Guardian provides a dashboard for IT departments to use to keep track of PCs and to do functions like remote lock and wipe, location tracking and geofencing.

"The Snapdragon X2 Elite SoC includes embedded cellular and Wi-Fi modems that can be used when the PC is off by drawing battery power to run that out-of-band functionality," continued Solis.

> "Qualcomm Guardian provides a dashboard for IT departments to use to keep track of PCs and to do functions like remote lock and wipe, location tracking and geofencing"

"Intel vPro processors can also do this functionality while the PC is off as long as it has a network connection, but typically this is going to be either Wi-Fi or Ethernet."

So as we move into 2026, who is best placed out of AMD, Intel and Qualcomm? "Intel, AMD and Qualcomm are all significantly improving their processors across data centres, PCs and other products that use PC processors or similar processors," said Solis.

"They are all improving their SoC configurations, CPU, GPU, NPU and other processor IP, evolving their GPU IP to better process AI workloads, reducing power consumption and more. 18A allows Intel to improve its cost structure over time by not having to outsource to an external fab, but right now it is likely very expensive given that yields have to increase. This is a long game for Intel – something that will play out for years and decades."

The £99 'Obsolete Computer' goes on sale

BackMarket breathes new life into Windows 10 laptops

With the curtain coming down on Windows 10 support (at least officially), BackMarket is trying to keep machines out of landfill with the £99 Obsolete Computer.

The refurbished PCs are being stripped of Windows and installed with ChromeOS Flex, effectively turning them into Chromebooks, albeit without access to the Android app store that most modern Chromebooks benefit from.

The first batch of Obsolete Computers were 14in Lenovo ThinkPad T470 laptops, but they sold out almost immediately, according to BackMarket's head of brand, Luke Forshaw. The company expects to continue releasing new waves of the devices as they arrive from recycling partner Zero Tech Waste.

Forshaw claims the company's research shows that around 400 million devices are likely to be made obsolete by the end of support for Windows 10. "We would expect, honestly, the majority of those to either end up in a drawer or be binned," he said.

Forshaw said the rather stark name of the Obsolete Computer was part of the company's drive to be "more forceful" about the "impact that planned obsolescence can have".

Each of the £99 computers sold by BackMarket comes with a 12-month warranty and a 30-day returns window. Forshaw said the company chose FlexOS rather than a rival Linux OS because "it's a fully functioning OS, works well on the devices, and gives the security we would want our users to have".

Talking of security, Microsoft has once again rowed back on the Windows 10 support cut-off that officially came into effect on 14 October. The company is now offering Extended Support Updates for free in the European Economic Area (which doesn't include the UK), as long as they sign in with their Microsoft account at least once every 60 days.

Outside of the EEA, the year's worth of Windows 10 security updates are still free for consumers, provided they sync their PC settings with the cloud or trade in 1,000 Microsoft reward points. Otherwise, the cost is $30 for the year.

Businesses are not getting off so lightly, with Extended Support Updates priced at $61 for the first year and doubling every year thereafter, for up to three years.

Is the AI bubble about to pop?

Fears are growing that the AI bubble might be on the brink of bursting. Barry Collins weighs up what could go wrong

If you've been smiling quietly to yourself every time you looked at your pension statement over the past couple of years, you've probably got AI to thank for the cushier retirement. For now, at least.

The AI bubble is continuing to inflate at a rapid rate. In 2024, generative AI companies raised $56 billion from venture capitalists – close to double the figure from 2023, according to financial database PitchBook. In the first quarter of 2025 alone, AI startups secured $73.1 billion.

The reason that your pension pot has been growing faster than Japanese knotweed is that many funds are tied to the fortunes of the "Magnificent Seven" – a collection of AI-linked companies that are lifting the broader market (*see below*). Nvidia alone is now worth more than $4 trillion.

Much of this growth is a bet on the future. A bet that all these chips, all these new data centres, all these AI services will drive enormous future revenues. Far more than they're doing currently. But if they don't, if AI doesn't become the irreplaceable workplace assistant it's being sold as, there's an awful lot of capital tied up in those soon-to-be-redundant data centres. If AI fails to live up to its hype, some predict it will make the dotcom crash look like a rounding error.

Reasons to be fearful

What should give you pause for thought before flicking through the Bentley catalogues? Well, there are more than a few signs that the AI hype is overcooked.

First is the extraordinary way those Magnificent Seven companies – Alphabet, Apple, Amazon, Meta, Microsoft, Nvidia and Tesla – have outperformed the rest of the market. During 2023-24, the weighted average share price of those seven firms rose by 156%, while the other 493 firms in the S&P 500 saw an increase of only 25%. America's stock market is largely riding on the fortunes of AI.

While there are signs of the rapid acceleration slowing this year – Nvidia's price/earnings (p/e) ratio is down to 48 in September 2025, a sharp fall from a huge peak of 230 in 2023 – it's still miles over historical averages. The FTSE 100 has an average p/e ratio of around 15. Oracle, which recently announced a massive deal with OpenAI, has a p/e ratio hovering around the high sixties. Investors are still gambling much harder on AI than conventional wisdom would suggest is wise.

> "Some predict it will make the dotcom crash look like a rounding error"

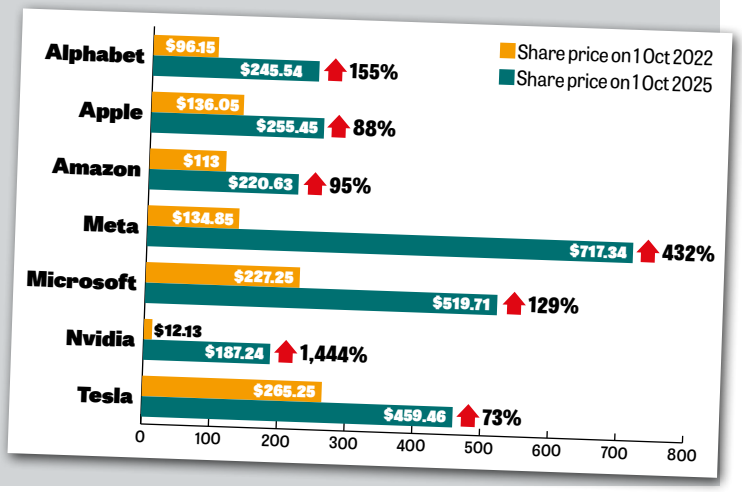
Then there's the inter-dependency of these firms to consider. Oracle's share price shot up because it inked a deal with OpenAI reportedly worth $300 billion over the next few years. OpenAI doesn't have $300 billion in its coffers, but some reports suggest Nvidia will invest up to $100 billion in OpenAI over the next few years, adding to smaller previous investments. The AI infrastructure Oracle will be building for OpenAI will inevitably involve Nvidia hardware, and so the money flows back and forth around these three companies, raising concerns about how

The rise of the Magnificent Seven

How much have the fortunes of the AI-related tech giants improved since the advent of AI? We're comparing the share prices of the seven companies involved between 1 October 2022 – a month before ChatGPT launched – to 1 October this year.

Even though every one of the seven has performed well over the three-year period, there are still clear winners. Nvidia chief among them, having seen its share price increase in value by close to 1,500%, but with Meta, Alphabet and Microsoft also showing triple-figure growth.

To put that in perspective, if you'd invested £10,000 in Nvidia back in October 2022, you'd now be sitting on a shareholding worth around £154,400 at the time of writing.



mutually dependent the fortunes of these massive players are. And what would happen should one stumble.

For some, it's a worrying echo of the dotcom bubble bursting at the turn of the millennium, when telecoms companies lent money to their customers. "It's not quite like what many of the telecom suppliers were up to in 1999-2000 but it has certain rhymes to it," British investor James Anderson, managing partner of Lingotto's innovation strategy fund, told *The Guardian* recently. "I don't think it makes me feel entirely comfortable from that point of view."

The other big risk is that customers don't see the benefits of deploying AI that will keep them spending big sums on the technology in the future. There's already some early evidence that the companies that have deployed generative AI aren't seeing a financial return. An MIT report published in July found that "despite $30-40 billion in enterprise investment into GenAI, this report uncovers a surprising result in that 95% of organisations are getting zero return".

However, once you get past that alarming headline finding, the report suggests that the reasons most early adopters are struggling to see a return is because it's not being used where it could really make a difference. Over 80% of firms have tried tools such as ChatGPT or Copilot, rather than invest in AI that fits into their current workflows. Around 70% of those GenAI budgets went into departments such as sales and marketing, where returns are easy to measure, instead of into areas such as back-office automation where AI could make a real difference, the report claimed.

Waiting for the returns

IDC president Crawford Del Prete acknowledges that companies failing to get a return from their AI deployments is "one of the most significant risks" of the AI bubble bursting. But he says it's wrong to judge the success of AI on how well, say, ChatGPT goes down in businesses.

"I would argue this is multifaceted," he told *PC Pro*. "It's also going to be how well does SAP, for example, Salesforce, Workday – all these SaaS vendors – integrate AI into their applications."

ABOVE Reports suggest the AI bubble may be about to go "pop"

> "This is real. The benefits to society from AI are going to be gigantic"

"It's the entire IT industry being able to say we have gobs and gobs of unstructured data, data that's dark in all these enterprises, and this is the first technology that can actually unlock insights from that data," he added. "I'm very optimistic that this technology is going to really help companies become much more efficient over time, but it's going to happen at different rates."

A good bubble?

Even if the current surge of investment in AI does prove to be a bubble that's pricked in the next couple of years, there are some that think it won't be a disaster. Among those, somewhat surprisingly, is the man behind one of those Magnificent Seven companies, Amazon founder Jeff Bezos.

In an interview at Italian Tech Week in early October, Bezos described the AI hype as an "industrial bubble as opposed to financial bubbles".

"The ones that are industrial are not nearly as bad, they can even be good," Bezos said. "Because when the dust settles and you see who are the winners – society benefits from those inventions. That's what is going to happen here too. This is real. The benefits to society from AI are going to be gigantic."

IDC's Crawford Del Prete thinks Bezos has a point. "This capacity that's being put in place is not going to go unused," he said. "It's going to be utilised by different customers that spin up these applications over time.

"Is there a risk that we're doing it ahead of how fast people can consume it? Of course, there's always that risk, but I do think this is a different type of situation. IDC spends a lot of time advising IT buyers. When a new technology comes out, whether it's the internet, whether it's the cloud, whether it's quantum computing, our stance will typically be, look, take a step back, evaluate it... This technology is the first technology we've said go to it, run towards it, embrace it.

"This is going to be something that you are going to need to master and leverage in your business model as quickly as possible," Del Prete added. "Because those that don't will do it at their own peril." ●

The A-List

The best products on the market, as picked by our editors

PC PRO A-LIST

PREMIUM LAPTOPS

Apple MacBook Pro M4

M4 beast from £1,599

from apple.com/uk

This M4 update to the already brilliant MacBook Pro line is an easy recommendation, so the big question becomes do you choose the 14in version from £1,599 or 16in from £2,499? And then how much do you upgrade, as Apple isn't afraid of high prices. But whatever you choose should last for years, and look great while it's doing it.
REVIEW **Issue 364, p50**

NEW ENTRY

Apple MacBook Air M4

If you don't need the all-out power of the Pro, this is a brilliant, cheaper alternative despite the unchanged chassis and screen. **13in from £999, 15in from £1,199 from apple.com/uk**
REVIEW **Issue 368, p54**

Honor MagicBook Art 14 (2025)

This slim 1kg laptop packs Intel's powerful Core Ultra 7 255H and a gorgeous 14.6in OLED touchscreen, yet survived for 12 hours in our light-use tests. And it looks gorgeous, too. **£1,500 from honor.com**
REVIEW **Issue 373, p59**

Acer Swift Edge 14 AI

This sleek, stylish laptop packs plenty of battery life and solid speed thanks to Intel's Core Ultra 7 258V chip. Consider spending £270 to extend the one-year warranty, though. **£1,199 from currys.co.uk**
REVIEW **Issue 375, p56**

BUSINESS LAPTOPS

Dell Pro 13 Premium

Sheer quality from £1,452 exc VAT

from dell.com

Dell's business laptop series has a new name, but its commitment to build quality and astonishing levels of configuration remain the same. Here, you benefit from a 1.1kg weight and 24-hour battery life, with Intel's 200V vPro series there for easier remote management. Just make sure you avoid the cheap screen option.
REVIEW **Issue 368, p46**

Lenovo ThinkPad X1 Carbon Gen 13

The best executive laptop out there, with true all-day battery life even if you buy the 14in OLED version. At 1kg and with the latest components, it's worth the price. **From £1,875 exc VAT from lenovo.com**
REVIEW **Issue 370, p52**

Lenovo ThinkPad T14s Gen 6 (Snapdragon)

There's no better laptop if you want to try out Snapdragon, thanks to its combination of build quality, speed and battery life. **£1,500 exc VAT from lenovo.com**
REVIEW **Issue 360, p56**

HP OmniBook Ultra Flip

A top-quality 2-in-1 with a terrific 14in OLED panel, great build quality and superb battery life thanks to Intel's latest generation Core Ultra 7 processors. **From £1,699 from hp.com**
REVIEW **Issue 365, p46**

CREATIVE & GAMING LAPTOPS

Lenovo Legion Pro 7i Gen 10

RTX 50 power from £2,800

from lenovo.com

A surprisingly elegant chassis considering the power within, even if it still weighs 2.7kg. In return you get a 16in OLED panel, Intel Core Ultra 9 275HX CPU and, in our test system's case, and Nvidia RTX 5080 GPU. Lenovo simply doesn't put a foot wrong.
REVIEW **Issue 370, p75**

Razer Blade 14

Our pick of the 14in gaming laptops thanks to its quiet running, gorgeous design and brilliant OLED panel. And the RTX 5070 graphics makes sense at this size. **RTX 5070, from £2,400 from razer.com**
REVIEW **Issue 372, p58**

Asus ProArt P16 (2025)

Packing a RTX 5070, Ryzen AI 9 and brilliant 16in OLED panel into its slim, 1.9kg chassis, this is a fantastic choice for demanding creatives. **£2,800 from asus.com**
REVIEW **Issue 371, p60**

Asus ROG Strix Scar 18 (2025)

Don't want to make any compromises? Choose this 18in monster, which weighs 3.3kg but extracts every drop from its components. **RTX 5090, £4,700 from asus.com**
REVIEW **Issue 370, p71**

EVERYDAY LAPTOPS

Asus Vivobook S15

Copilot+ PC for £699

from currys.co.uk

This is one of the best-value laptops around, with an eight-core Snapdragon X Plus chip speeding things along in general use – albeit not in games. At 1.4kg it's extremely light for a budget 15.6in laptop and its battery life is excellent too.
REVIEW **Issue 371, p83**

NEW ENTRY

Acer Aspire Vero 16

An eco-friendly laptop due its use of PCR plastics, but more to the point a well-built and powerful 16in laptop that should last for many years. **£999 from currys.co.uk**
REVIEW **Issue 373, p60**

HP OmniBook Ultra 14

If you have £999 to spend, consider the 16GB/512GB version of this cracking machine, with its aluminium chassis, 14in IPS panel and speedy Ryzen AI 365 CPU. **From £999 from hp.com**
REVIEW **Issue 371, p87**

HP OmniBook 5 NGAI 14in

If you only have a £600 budget this Snapdragon-powered laptop's gorgeous OLED panel, 20-hour life and 12.6mm thickness make it a great choice. **£599 from currys.co.uk**
REVIEW **Issue 375, p58**

CHROMEBOOKS

Lenovo Chromebook Plus Gen 10

MediaTek AI power for £549

from lenovo.com

Simply the best Chromebook around thanks to a gorgeous 14in OLED screen and AI-enhanced skills courtesy of the MediaTek Kompanio Ultra 910 CPU. Add a well-built aluminium frame, 1.2kg weight and all-day battery life for the win.
REVIEW **Issue 374, p54**

Acer Chromebook Plus 516

If you can't afford the 15.6in Samsung Galaxy Chromebook Plus then Acer's Chromebook Plus 516 makes a solid but less beautiful alternative – as reflected in its price. The 15.6in screen provides plenty of space on which to work, and it proved a fast performer in our tests.
From £399 from acer.com
REVIEW **Issue 371, p90**

Samsung Galaxy Chromebook Plus (2024)

The first truly desirable Chromebook since the Pixelbook, this is a top-quality laptop from the all-metal chassis to the 15.6in Full HD OLED screen. And thanks to Intel's Core 5 120U processor, it's fast enough to last for years. **Core 5 power for £749 from samsung.com**
REVIEW **Issue 364, p65**

MINI PCs

Wired2Fire AMD R8845 Mini PC

AMD firepower for £600

from wired2fire.co.uk

If you can live with a little noise, this mini PC is a revelation. Here's a sub-one-litre PC for £600 that can beat range-topping models from the major brands, with a generous base spec that you may never have to upgrade – but there's scope for it if you do.
REVIEW **Issue 374, p88**

Minisforum UM750L Slim

This brilliant mini PC offers solid everyday speeds for a price that looks like a typo. It's sensational value thanks to the AMD Ryzen 5 7545U processor, 16GB of RAM and a 1TB SSD in a small and quiet package, with the added bonus of low running costs.
£299 from minisforum.uk
REVIEW **Issue 374, p86**

Minisforum AI X1 Pro

Want power? The X1 Pro has it in spades, whether you buy the barebones system for £659 or the version we tested with 64GB of memory, a 1TB SSD bearing Windows 11 Pro and AMD's Ryzen AI 9 HX 370 processor. It's larger than the UM750L Slim but worth it.
£939 from minisforum.uk
REVIEW **Issue 374, p87**

ENTHUSIAST PCs

Scan 3XS Edge iCue

Silent but deadly fast for £2,800

from scan.co.uk

With the RTX 5080 comes a refresh of best enthusiast PCs. The Scan is a shade slower than its Ryzen 9 9800X3D rival from Wired2Fire, but even at full pelt it remains astonishingly quiet.
REVIEW **Issue 367, p50**

CyberPower PC Ultra 3D5090

If you're after the fastest gaming PC you can buy for £4,000, let's make things easy for you: buy this. It's packed with speedy components, from AMD's Ryzen 9 9950X3D to RTX 5090 graphics to a 2TB Gen 5 SSD.
£4,000 from tinyurl.com/370cyber
REVIEW **Issue 370, p58**

CyberPowerPC Ultra R5XT Gaming PC

This striking PC shines thanks to quiet running, AMD's fast Ryzen 7 9700X processor and 16GB Radeon RX 9060 XT graphics. With a 2TB SSD in tow, it's a great all-rounder for the money. **£1,349 from cyberpowersystem.co.uk**
REVIEW **Issue 374, p65**

ALL-IN-ONE PCs

Apple iMac M4

M4 power from £1,299

from apple.com/uk

Anyone hoping for a 27in iMac will be disappointed, but everyone else should be delighted by this M4-powered all-in-one with its 24in 4,480 x 2,520 IPS panel. It's fast inside and out, too, with Thunderbolt 4 and Wi-Fi 6E.
REVIEW **Issue 364, p48**

Lenovo Yoga AIO 27i Gen 10 (Intel)

This sturdy yet elegant all-in-one packs in everything most people need, including an Intel Core Ultra 7 255H processor, 16GB of RAM, a 1TB SSD and a solid 27in 120Hz IPS panel. The stand is height-adjustable, too, and this all-in-one PC even has light gaming potential.
£1,270 from lenovo.com
REVIEW **Issue 374, p59**

Lenovo Yoga AIO 9i Gen 10

The first all-in-one Copilot+ PC is a superb evolution of Lenovo's gorgeous Yoga AIO 9i, with a 31.5in IPS 4K panel, Intel's "Lunar Lake" Core Ultra 200V processors and gaming prowess via RTX 4050 graphics as an option. **From £1,800 from lenovo.com/uk**
REVIEW **Issue 373, p63**

CREATIVE WORKSTATIONS

Scan 3XS GWP-A1-TR64

64-core 'ripper for £11,000 exc VAT

from scan.co.uk/3xs

Scan takes advantage of AMD's new 9000-series Ryzen Threadrippers, the 64-core 9980X, to deliver a monster of a workstation that topped almost all of our performance charts. It's helped by an RTX Pro 6000 Blackwell card and 128GB of memory. It's even a quiet runner.
REVIEW **Issue 373, p93**

Armari Magnetar MC64T9

Like Scan, Armari uses the latest AMD Threadripper silicon, this time the 32-core 9970X, to create a truly potent machine – with the assistance of 256GB of DDR5 memory and RTX Pro 600 Blackwell graphics. Simply a great workstation. **£10,995 exc VAT from armari.com**
REVIEW **Issue 373, p90**

HP Z2 Mini G1a workstation

Built around AMD's powerful Ryzen AI Max+ Pro 395 processor with 128GB of unified RAM, this versatile workstation can be used for everything from creative tasks to running LLMs with up to 128 billion parameters. **As reviewed, £2,280 exc VAT from hp.com**
REVIEW **Issue 374, p60**

TABLETS

Apple iPad Air M3

Languid power from £599

from apple.com/uk

It's hard to be too excited by this update as it's exactly the same design but with an M3 chip inside. But when the original was so damn good, whether in 11in or 13in variants, and Apple Intelligence is thrown in, it remains the best choice for the vast majority of tablet buyers.

REVIEW **Issue 368, p56**

Apple iPad Pro M4

The best tablet in the world becomes even better thanks to Apple's stunning M4 chip, a gorgeous OLED screen and the must-have accessory: the all-new Pencil Pro. But it comes with an obvious downside of cost, with the cheapest 13in incarnation costing £1,299. **From £999 (11in, 256GB) from apple.com**

REVIEW **Issue 358, p48**

OnePlus Pad 3

Not only the best Android tablet you can buy but a genuine rival to the iPads thanks to its support for Apple products via integrated file sharing and a Mac Remote Control feature. It's also fast, packs a superb 13.2in screen and comes with a fine array of accessories. **From £529 from oneplus.com**

REVIEW **Issue 371, p62**

EVERYDAY PHONES

NEW ENTRY

Google Pixel 9a

Why pay more? From £499

from store.google.com

If you can live without an optical zoom then it's hard to think of a reason to pay more for a phone. The AI features are genuinely useful, it's fast, the battery lasts forever, the camera is superb and the 6.3in OLED panel is a joy to gaze at.

REVIEW **Issue 369, p74**

Nothing Phone 3a

Looking to get the best possible phone for around £300? This is it. Quite aside from Nothing's unique design, it features a gorgeous display and high-quality cameras – including an optical zoom that few phones in this price bracket can match.

£329 from nothing.tech

REVIEW **Issue 368, p77**

Fairphone 6

Unique among phones for its five-year warranty and the ease of repair and customisation, this mid-range phone will last for years. There's even a microSD slot! Sure, its CPU and camera are nothing to shout about, but this is the clear winner for sustainability.

£499 from fairphone.com

REVIEW **Issue 375, p52**

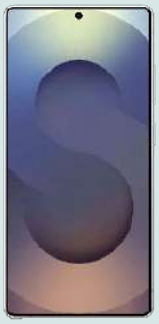
PREMIUM PHONES

NEW ENTRY

Samsung Galaxy S25 Ultra

AI in your hand from £1,249

from samsung.com/uk



So good it tempted our reviewer – an iPhone devotee – to move to the other side. That's thanks to the faultless hardware, brilliant photography performance and Samsung's slick AI, not to mention the integrated S Pen stylus. It's not cheap, but you're buying for the long term with seven years of OS updates.

REVIEW **Issue 367, p70**

Apple iPhone 17

With a superb optical zoom, brilliant cameras, excellent all-round performance and a surprisingly generous amount of storage – 256GB for £799 – we think there are fewer reasons than ever before to "go Pro". Other than battery life, which may push power users to upgrade.

256GB, £799 from apple.com/uk

REVIEW **Issue 375, p70**

Google Pixel 10

A tempting alternative to the Pixel 10 Pro as the plain Pixel now includes the same 5x optical zoom camera, many of its brother's AI features and Google's answer to MagSafe, known as "Pixelsnap". And it comes in more interesting colours, too. The Pixel 10 Pro is great, but why pay £200 more?

£799 from store.google.com

REVIEW **Issue 374, p74**

24IN TO 27IN MONITORS

BenQ DesignVue PD2730S

5K + Thunderbolt, £1,000

from scan.co.uk

A great choice for creative professionals and demanding users alike, and if your budget can take it why not daisy-chain two together over Thunderbolt? You'll love the image quality and 5K resolution.

REVIEW **Issue 372, p89**

Asus ZenScreen Smart Monitor MS27UC

This stylish 27in monitor packs a high-quality 4K screen, but where it distinguishes itself is by loading Google TV and great speakers to turn it into a great choice for those who need to work and play. **£399 from argos.co.uk**

REVIEW **Issue 372, p88**

Iiyama ProLite XUB2797QSNP-B1

This 1440p monitor may lack the luxuries of its A-List brethren, but you can't argue with the quality of the panel, nor the connectivity – with an RJ45 port, this is a true docking monitor.

£237 from iiyama-monitors.co.uk

REVIEW **Issue 372, p84**

32IN+ MONITORS

Iiyama ProLite XCB3497WQSNPH

Curved quality, £380

from scan.co.uk

All three displays here use curved 34in panels with a 3,440 x 1,440 resolution. Despite an aggressive price the ProLite packs everything you need including RJ45 networking and a KVM.

REVIEW **Issue 372, p93**

MSI Modern MD342CQPW

You won't find RJ45 networking here – as expected to hit the bargain price – and others go brighter, but this 34in curved, white monitor delivers terrific colour coverage, a decent pair of speakers and USB-C docking in a stylish casing.

£299 from currys.co.uk

REVIEW **Issue 372, p91**

Philips 34B2U6603CH

This monitor packs in every feature we can think of: Thunderbolt 4, daisy-chaining, excellent 5W speakers, 2.5GbE networking and a high-quality webcam. The cheaper ViewSonic VG3457CV beats it for clean whites, but the Philips is a better all-rounder.

£559 from uk.insight.com

REVIEW **Issue 372, p92**

WEBCAMS

Logitech MX Brio 705 for Business

Consistent brilliance for £219

from logitech.com

Consistent image quality in all lighting conditions coupled with top build quality and nifty features – such as a presenting mode for items on your desk – make this a fantastic all-round choice.
REVIEW **Issue 356, p68**

Logitech Brio 105 for Business

While you can buy 1080p webcams for a third of the Brio 105's price, they won't hold a candle to the Logitech webcam's quality – especially in low-light conditions, such as one candle. It's also easy to manage, for businesses and individuals.
£45 from logitech.com
REVIEW **Issue 360, p77**

Obsbot Tiny 2

This portable 4K webcam delivers for quality, design and sharpness, and it comes with a shedload of advanced features, including dynamic zoom and subject tracking. The only real downside is that it has a price that reflects its premium ambitions.
£329 from amazon.co.uk
REVIEW **Issue 352, p75**

HOME OFFICE PRINTERS

HP OfficeJet Pro 9135e

Do-it-all inkjet for £193

from printerbase.co.uk

This versatile inkjet all-in-one – which includes a 35-page ADF – pumps out high-quality prints at laser-rivalling speeds. Likewise scans and copies. Print costs are reasonable, too.
REVIEW **Issue 365, p85**

Epson EcoTank ET-2865

As usual with ink tank printers, you don't get many frills with the Epson EcoTank ET-2865 (so no ADF or screen). What you do get is incredibly low running costs of 0.5p for colour and 0.2p for mono, plus high-quality prints and scans.
£233 from uk.insight.com
REVIEW **Issue 365, p84**

Canon i-Sensys LBP243dw

Everything you could want from a mono laser printer – it doesn't come with a scanner – the LBP243dw produces excellent results at speed. You also get Wi-Fi and wired networking. **£186 from printerbase.co.uk**
REVIEW **Issue 365, p88**

WORKGROUP PRINTERS

Canon Maxify GX6550

Ink tank all-in-one for £392 exc VAT

from canon.co.uk

Designed to fit in tight spaces, this all-in-one includes a highly effective ADF and backs it up with high-quality prints at 24ipm in our tests. Running costs are superb, too.
REVIEW **Issue 350, p58**

Brother HL-L9430CDN

This laser printer (not an all-in-one, so there's no scanning or copying functionality) is a great choice for a busy office, producing sharp black text and making a good job of colour graphics as well. All while doing so quickly with a competitive price per page. **£415 exc VAT from printerland.co.uk**
REVIEW **Issue 353, p84**

Xerox B315DN

A fine alternative to the Brother and Canon, this mono laser multifunction printer produces superb results at great speed – 27.5 pages per minute in our 50-page test, which includes the spool time. It's similarly quick for scans, with a dual-CIS ADF to speed up double-sided copies. **£238 exc VAT from printerbase.co.uk**
REVIEW **Issue 341, p87**

WIRELESS ROUTERS

Netgear Nighthawk RAXE300

Fast Wi-Fi 6E router, £350

from amazon.co.uk

The RAXE500 is faster than the RAXE300, but in practice we doubt you would notice – this tri-band router still delivered speeds between 50MB/sec and 150MB/sec in our tests. And it's packed with features, too. At £150 cheaper than its bigger brother, we think it hits the Wi-Fi 6E sweet spot.
REVIEW **Issue 341, p68**

TP-Link Archer BE550

At almost half the price of the Netgear Nighthawk RAXE300, this is a brilliant mid-range choice thanks to a 6GHz radio and five 2.5GbE ports – you'll enjoy superb wired and wireless performance, and it even comes with a wide set of features. **£180 from amazon.co.uk**
REVIEW **Issue 371, p70**

Asus RT-BE58U

A great deal for those on a tight budget, this dual-band Wi-Fi 7 router (there's no 6GHz radio) performed well in our 5GHz tests at a price that can't be beaten. You can even enable MLO across the 2.4GHz and 5GHz bands.
£99 from amazon.co.uk
REVIEW **Issue 371, p70**

MESH WI-FI

TP-Link Deco XE200

Clever Wi-Fi 6E for £400

from amazon.co.uk

There are cheaper Wi-Fi 6E meshes, but the XE200 wins for its superb download speeds, excellent coverage and the fact that older clients reap benefits of 6E, not just new ones. And a two-pack (code BOBKTDPWC8) should be enough for most premises.
REVIEW **Issue 349, p65**

Netgear Orbi 770

If you're eager to upgrade to Wi-Fi 7 then the Orbi 770 is the best mesh option yet. Its speed and range are both excellent, with a twin-pack covering 420m² (says Netgear), and the wired connectivity superb: four 2.5GbE connectors on the router unit, two 2.5GbE ports on the satellites. But it ain't cheap. **2-pack, £600 from amazon.co.uk**
REVIEW **Issue 364, p70**

Linksys Velop Pro 6E

Ironically, this Wi-Fi 6E router will get the most out of your non-Wi-Fi 6 devices thanks to its use of the 6GHz network for station-to-station traffic. And you only need two units for rock solid performance across a three-bedroom house. **2-pack, £380 from amazon.co.uk**
REVIEW **Issue 350, p54**

BUSINESS WI-FI

Ruijie Reyee RG-RAP73Pro

Wi-Fi 7 AP, £201 exc VAT

from broadbandbuyer.com

The RG-RAP73Pro delivers a wealth of features and top Wi-Fi 7 performance at a tempting price. Broadbandbuyer's provisioning service makes light work of deployment, and the free Ruijie Cloud service offers top-notch remote management.

REVIEW **Issue 369, p103**

TP-Link DR3650v

"Business Wi-Fi" doesn't do justice to this all-in-one communications, security and networking solution, which combines a dual-band AX3000 access point with WAN redundancy, failover services and a treasure trove of features. **£208 exc VAT from broadbandbuyer.com**

REVIEW **Issue 368, p103**

DrayTek VigorAP 905

The VigorAP 905 is ideal for businesses seeking a well-endowed Wi-Fi 6 AP with top-notch wireless meshing support. It's a breeze to deploy, wireless performance is good, and a price of only £83 makes it outstanding value. **£83 exc VAT from broadbandbuyer.com**

REVIEW **Issue 372, p102**

NAS SERVERS

Synology DiskStation DS1823xs+

10GbE NAS, £1,413 exc VAT

from broadbandbuyer.com

This stalwart retains its top spot on the A-List thanks to its powerful performance (courtesy of a Ryzen chip), huge capacity via eight LFF/SFF hot-swap SATA bays and an unmatched set of business-friendly apps. And it's all built on Synology's DSM 7.2, which is focused on data security.

REVIEW **Issue 368, p99**

Asustor Nimbustor 4 Gen2 AS5404T

Built for SMBs and enthusiasts who demand the best performance, the AS5404T is a four-bay NAS that offers much more than most, with some nice surprises under its standard-looking exterior. **£441 (£529 inc VAT) from amazon.co.uk**

REVIEW **Issue 369, p88**

Qnap TS-264

The Qnap TS-264 is aimed at those who want a bit more from a traditional two-bay NAS. It's effectively the two-bay version of the excellent four-bay TS-464, and like its sibling provides strong speeds over its pair of 2.5GbE ports – and includes two M.2 NVMe slots. **£391 (£469 inc VAT) from ukstore.qnap.com**

REVIEW **Issue 369, p86**

VIDEOCONFERENCING

Biamp Parlé VBC 2800

Go big for £2,918 exc VAT (MSRP)

from midwich.com

We thought the VBC 2500 was a great VC room bar, and the new VBC 2800 delivers Biamp's undeniable expertise to larger meeting rooms. Video and audio quality are outstanding, speaker framing is super fast and the smart combination of dual camera lenses makes sure everyone is in the big picture.

REVIEW **Issue 364, p98**

Owl Labs Medium Room Solution

The Owl 4+ and Owl Bar partnership offers smart tracking and dynamic split-screen views to ensure everyone is in the picture, while the Whiteboard Owl adds extra professionalism to presentations and training sessions. **Owl 4+, Owl Bar, TV mount, £2,999 exc VAT from owllabs.co.uk**

REVIEW **Issue 364, p100**

Ricoh Meeting 360

Ricoh's Meeting 360 is up against stiff competition in the panoramic meeting hub market but stands out for its excellent build quality and generous three-year warranty. It's easy to use and delivers good video and audio quality, while the smart app allows you to create a view for every occasion. **£744 exc VAT from amazon.co.uk**

REVIEW **Issue 364, p101**

SCANNERS

Brother ADS-4900W

60ppm for £529 exc VAT

from tradescanners.com

An incredible range of features at a competitive price. Scan speeds are even faster than the quoted 60ppm, output quality is excellent and top-notch software and apps deliver a wealth of options.

REVIEW **Issue 370, p98**

Ricoh fi-8040

Ricoh's fi-8040 offers SMBs a remarkable range of features for a great price. Output quality is beyond reproach, it delivers on its 40ppm promises and the multiple operational modes make it highly flexible. **£249 exc VAT from thescannershop.com**

REVIEW **Issue 370, p101**

Canon imageFormula DR-S350NW

You don't need to install this affordable networked desktop scanner, which almost hit 55ppm scan speeds in our test. Canon backs it up with a fine software package. **£433 exc VAT from printerland.co.uk**

REVIEW **Issue 370, p99**

SECURITY APPLIANCES

DrayTek Vigor C510ax

Unbeatable redundancy for £447 exc VAT

from broadbandbuyer.com

Ideal for SMEs and remote sites that need always-on internet access. It's packed with WAN redundancy features, the latest DrayOS 5 software delivers a wealth of features, and it all comes at a great price.

REVIEW **Issue 372, p99**

Zyxel USG Flex 50HP

Don't be fooled by its size: Zyxel's USG Flex 50HP packs in an impressive set of security services for the price. It's ideal for protecting small offices and remote sites, and the slick Smart Sync feature means never having to choose between local or cloud management. **Appliance with 1yr Gold licence, £316 exc VAT from store.zyxel.com**

REVIEW **Issue 372, p101**

WatchGuard Firebox T85-PoE

A powerful gateway security package ideally suited to protecting large remote sites. Licensing schemes are easy to understand, and WatchGuard's cloud portal makes light work of remote management. **Appliance with 3yr TSS subscription, £4,284 exc VAT from broadbandbuyer.com**

REVIEW **Issue 372, p100**

SECURITY SUITES

NEW ENTRY

Avast Ultimate

Buy from a third-party store and you'll get top levels of AV protection and a superb set of features – including a solid VPN – for a great price. **10 devices, 2 years, £30 from store.pcpro.co.uk**

REVIEW **Issue 375, p84**

NEW ENTRY

Norton 360 Deluxe

Packs plenty of features at low prices – if you buy from a third-party store. Note the generous 50GB cloud backup service that comes with 360 Deluxe. **3 devices, 15 months, £10 from store.pcpro.co.uk**

REVIEW **Issue 375, p90**

NEW ENTRY

Avast Free Antivirus

Don't want to pay for a full security suite? Avast offers a surprising amount for free, making it an excellent alternative to Microsoft Defender. Opt to minimise its interruptions, though. **Free from avast.com**

REVIEW **Issue 375, p92**

VPNs

ExpressVPN

Blistering speeds, outstanding region-shifting performance and a good track record on security mean this VPN is worth the expense. **2yr 4mth $140 (£113) from expressvpn.com**

REVIEW **Issue 370, p84**

Mullvad

A consistent performer with consistent pricing – there's no need to sign up for the long term as it costs only €5 per month as a flat rate – but not the best choice for region shifting. **€5 (£4.34) per month from mullvad.net**

REVIEW **Issue 370, p85**

Proton VPN Free

While Proton's VPN Plus is also a great choice, if you're looking for a freebie then choose this VPN for its fast connections (or alternatively Windscribe if you need to choose territories). **Free from protonvpn.com**

REVIEW **Issue 370, p89**

LINUX DISTROS

Ubuntu

A fine choice for Windows switchers thanks to its familiar design, with regular six-monthly updates and a Long Term Support version. **Free from ubuntu.com**

REVIEW **Issue 367, p92**

Fedora Workstation

One of the longest-established distros, and with a strong link to Red Hat Enterprise Linux, Fedora Workstation will particularly appeal to business migrators. **Free from fedoraproject.org**

REVIEW **Issue 367, p85**

Linux Mint

There's a good reason this is a popular choice for Windows 10 refugees, including a familiar "Start menu", and it's easy to give it a trial before committing. But consider Zorin OS, too. **Free from linuxmint.com**

REVIEW **Issue 367, p86**

CLOUD BACKUP

IDrive Business

An incredibly affordable hybrid backup solution. It's easy to deploy, supports Google Workspace, Microsoft 365, Dropbox and Box, and is ideal for protecting remote and on-premises systems. **5TB, £791 exc VAT per year from idrive.com**

REVIEW **Issue 371, p100**

Barracuda Backup Vx

This affordable virtualised on-premises backup solution is easy to deploy on VMware or Hyper-V hosts and integrates local and cloud backup. **From £804 exc VAT per year from barracuda.com**

REVIEW **Issue 371, p99**

NETWORK MONITORING

Progress WhatsUp Gold 2024

A great SMB choice as it presents a clear picture of your network and is available in a wide range of licensing plans. It's a cinch to deploy, doesn't require a lot of host resources and the new features make it even easier to customise. **Enterprise, 50 devices, £1,177 exc VAT per year from whatsupgold.com**

REVIEW **Issue 366, p100**

Park Place Technologies Entuity 22

An impressive toolbox of monitoring services all easily managed from a web console that offers a wide range of informative dashboards. **From $150 per node/year from parkplacetechnologies.com**

REVIEW **Issue 366, p99**

VOIP SERVICES

3CX Phone System 20 Update 5

Deployment options are extensive, call-handling features are excellent and, although you'll need to source an SIP trunk, 3CX's Phone System 20 is very affordable. **Enterprise, 8SC, £385 exc VAT per year from 3cx.com**

REVIEW **Issue 369, p98**

TelephoneSystems.Cloud

Ideal for businesses that don't want any unpleasant billing surprises, with an impressive range of call-handling features. **From £11 exc VAT per user per month from telephonesystems.cloud**

REVIEW **Issue 369, p100**

BUSINESS BACKUP

Arctera Backup Exec 25

SMBs seeking affordable data protection for physical and virtual environments will love Arctera's Backup Exec 25. The licence plans are easy to manage, it offers essential ransomware protection and introduces plenty of new features. **Simple Core Pack, 5 instances, £612 exc VAT per year from senetic.co.uk**

REVIEW **Issue 374, p99**

Nakivo Backup & Replication 11

Supports more host platforms than rivals, has a range of affordable licence plans, and delivers extensive data and ransomware protection. **Enterprise, 5 servers, perpetual, £937 exc VAT from nakivo.com**

REVIEW **Issue 374, p101**

REMOTE SUPPORT

IDrive RemotePC Enterprise

Large businesses that want a flexible and feature-rich cloud-hosted support solution will love RemotePC Enterprise. It provides technicians with a wealth of support tools, access security is tight, and IDrive's simple licensing plans are superb value. **First year, 100 PCs, £329 exc VAT from remotepc.com**

REVIEW **Issue 373, p99**

Zoho Assist Professional

Assist lives up to its name: it's easy to use and manage, offers a wealth of support features, and licensing plans are flexible. **£12 exc VAT per month/technician billed yearly from zoho.com/assist**

REVIEW **Issue 373, p101**

ENDPOINT PROTECTION

NEW ENTRY

WithSecure Elements Endpoint Security

An impressive range of protection measures all managed from a single web portal. Platform support is excellent, the modular design makes it simple to customise, and it's priced right for SMBs. **100-499 workstations, £37 exc VAT each per year from withsecure.com**

REVIEW **Issue 375, p101**

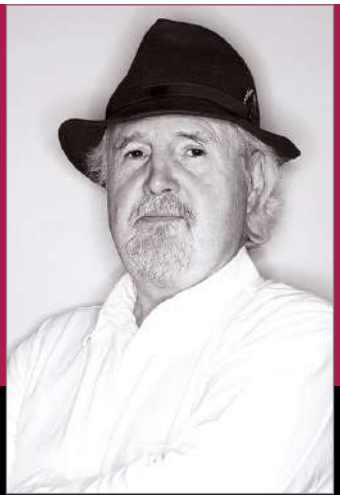
NEW ENTRY

Sophos Central Intercept X Advanced

Impressive endpoint protection measures and security features, and it's all easily managed from one of the best cloud portals on the market. **50-99 users, £52.88 exc VAT each per year from broadbandbuyer.com**

REVIEW **Issue 375, p99**

Confessions of an audio dentist



Dick Pountain is editorial fellow of *PC Pro*. He doesn't have "golden ears" but he does have dry earwax. @dick-pountain

Extracting troublesome Bluetooth headphones with the help of a soldering iron and a steady hand results in one much happier web call participant

I love music and I love soldering. Here is a story that has both. I've explained my opinions about hi-fi here several times: I like good sound quality but I'm not a hi-fi nut, don't buy oxygen-free cables or onyx cartridges or gold-plated anything, and definitely didn't colour in the edges of my CDs with a green marker pen. I won't spend thousands on any component, and if you happen to have issue 330 to hand you can read how my listening was transformed by connecting a cheap Fosi Class D Bluetooth amplifier to my vintage Castle speakers (legacy items from when Dennis Publishing used to publish *Hi-Fi Choice* magazine).

All sound from my Chromebook Plus gets routed via Bluetooth through these speakers and I remain delighted by its quality, but a problem arose. I have to attend regular Zoom committee meetings, where we discovered that my Bluetooth remote arrangement was causing irritating echo effects for the other members, so I decided to resort to headphones. I bought a set of moderately priced JBL wireless headphones, which solved the echo problem but also created a slight annoyance for me because the dreaded Bluetooth wouldn't automatically switch itself on; I had to manually disconnect the Fosi amp in Settings and select the JBLs.

Now with my other, sociological, hat on I'm a keen observer of the doings of Gen Z youth, which include discovering a preference for vintage digital cameras over smartphones and for wired headphones over wireless ones. Aha, I thought, in my Santa's-Grotto-of-retired-digital-artefacts upstairs there must be some of those, and there were indeed two – Sony MDR V100s and Sennheiser HD 201s that I hadn't used for decades. I tried them and both worked fine: the Sonys sounded surprisingly good, but the Sennheisers sounded terrific. So terrific I decided to do the pseudo-scientific thing, an A/B/C comparison with the Sony and Bluetooth JBLs. The result shocked me as I far preferred the Sennheisers. The JBLs were louder and had more bass, but somehow they, and the Sonys, were less "engaging".

> "I like good sound quality but I'm not a hi-fi nut, don't buy oxygen-free cables or gold-plated anything"

Engagement is difficult to discuss without descending into woo-woo. The Sennheisers are very light (plastic and aluminium) and oval in shape so they encase my ears rather than resting on them. Their soundstage is better balanced, with bass that's less pronounced but also just right. (I judge sound reproduction by just two instruments, acoustic piano and double bass; for my A/B/C test I used the tracks "Mademoiselle Mabry" by Miles Davis and Janáček's "On an Overgrown Path" played by Josef Páleníček). The Sennheisers induced what we used to call a "drugless trip", where you engage so far that you feel *there*.

Problem was, those Sennheisers were made in 2005, the era of plastic-from-hell that turns into chewing gum with age. The outer insulation on their far-too-long cable was rotting and peeling, to reveal not the expected red or black plastic-covered conductors but a gleam of bare copper. I tried insulating tape, Gorilla tape, even silicon sealer, but ended up with an ugly, sticky mess.

Wanting them so much emboldened me to replace the cable myself. Gemini taught me that those inner conductors are called tinsel wire, microscopically thin strips of copper coated with an insulating lacquer that you can't just scrape off, spirally wound like guitar-strings around a central textile cord. Soldering them is a real challenge and, reader, I took it!

> "The signal path from recording studio to my eardrums is long and convoluted, via TCP/IP, Wi-Fi and various AC-DAC-and-backs"

From Amazon I bought two short cables with female RCA plugs going to bare wire, along with a longer cable from 3.5mm jack to twin male RCA plugs. Snipped off the old cable, took out four tiny screws to disassemble each earpiece, only to find a single black box holding all the gubbins from which emerge two horse-hair-thin tinsel wires lacquered red and blue. YouTube explained how to create of large blob of molten solder and plunge the wire into it: if the temperature is just right that burns off the lacquer (with a puff of smoke), adheres to and tins the copper; if the temperature is too high it burns off the copper; too low and it doesn't adhere. I chopped up the old cable to practise and practise, only suffering one painful burn, and then did the deed.

Reassembling and finding they worked, I punched the air in triumph. Completed the job by discovering that my Chromebook's two USB-C ports support high-def audio. Back to Amazon for a UGreen adapter from USB-C to 3.5mm jack that contains a 32-bit/384kHz DAC, giving more volume and (perhaps) slightly better definition than the audio jack socket. The signal path from recording studio to my eardrums is long and convoluted, via TCP/IP, Wi-Fi and various different AC-DAC-and-backs, but at least I've managed to extract one irritating Bluetooth.

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The AI bust is going to break the economy

The social experiment known as artificial intelligence is being run on all of us, but what happens if it fails?

Nicole Kobie is *PC Pro*'s Future's editor. She wants to be clear she's not a Luddite when it comes to AI, she's just an old millennial tired of economic crashes. So very tired.
@njkobie

AI companies are gambling with an awful lot – and I don't mean the existential threat of AGI killing or enslaving all humans.

The utility of AI is questionable, yet we're chucking trillions of dollars at infrastructure, regardless of its impact on the landscape, water or energy. The firms building these systems don't have the money to pay for it all, so they're building increasingly circular deals that will pay off if it all works out, or lead to serious financial turmoil if not.

OpenAI recently announced a $300 billion contract with Oracle as part of Stargate data centre plans. Analysts at KeyBanc Capital Markets estimated Oracle will need to borrow $100 billion over the next few years to pay for it; if AI stumbles and OpenAI can't pay, that's one heck of a default. Makes me feel better about my credit card debt.

A few weeks later, it was Nvidia's turn. OpenAI ordered at least ten gigawatts of Nvidia's systems, the first of which will come online next year. As each 1GW worth is deployed, Nvidia will invest $10 billion into OpenAI, effectively giving the AI developer the funds to buy the next pile of chips,

> "As yet, OpenAI makes no profit. This time last year it was struggling to raise $6 billion to keep the lights on"

raising concerns among analysts about the "circular" nature of the deal.

OpenAI then lined up six gigawatts' worth of AMD systems over a multi-year deal. Helpfully, AMD has offered its partner the option of buying 160 million shares at a low fixed price – we're talking a penny each. Financial experts estimated those shares are currently worth about $34 billion, but if the final bit of the deal is achieved and AMD hits a $600 share price, that full value could be $96 billion.

As yet, OpenAI makes no profit, posting an annual revenue last year of $10 billion, although that's expected to double this year. That's impressive for a ten-year-old, but this time last year it was struggling to raise $6 billion to keep the lights on. Despite that, it's now valued at $500 billion, a leap from $157 billion last year. Most people had never even heard of it until three years ago, but sure, half a trillion.

That's just OpenAI; similar transactions are being repeated at companies across the AI industry, though perhaps less dramatically. Clearly cutting-edge tech necessitates innovative accounting to pay for it all.

The heavy spending and overstretched finances of these firms is a problem because we may well be standing on what Gartner calls in its hype cycle the "Peak of Inflated Expectations", and that means we're about to tumble into the "Trough of Disillusionment" – which would make a great name for a band for someone who loses their job to all this.

The backlash is looming, and it's evidence based. MIT research revealed that 95% of AI pilots they examined weren't delivering useful outcomes. A Wiley study noted that the more researchers use AI, the more their confidence in it falls. An EY report found that nearly every company surveyed that rolled out AI had seen an initial financial loss, pinning it on flawed outputs, bias and sustainability concerns – all issues raised early on with these technologies. A paper by Apple staff showed more advanced systems are beset by "complete accuracy collapse". Deloitte was caught with fake citations in a serious official report, and will have to repay the Australian government some of its fee. Klarna had to rehire human customer service staff after bots weren't up to the job.

The hype, looming disappointment and big money at risk has people smarter than me worried.

The Bank of England warned of the risk of a "sharp market correction" over concerns that AI company valuations leave the wider market exposed "should expectations around the impact of AI become less optimistic". IMF chief Kristalina Georgieva told everyone to "buckle up". Investors Goldman Sachs warned a slowdown in AI could slap the market down by 20%.

> "If it doesn't pan out as promised, we could tank the markets and disrupt the global economy; but if it does deliver, it's not you who's going to get rich"

The financial risks are huge, and that's before we get into environmental, societal and opportunity costs, all of which are significant. Imagine what else we could accomplish with even a slice of these riches.

This is the gamble brought by generative AI: if it doesn't pan out as promised, we could tank the markets and disrupt the global economy; but if it does deliver, it's not you who's going to get rich – after all, successful AI promises to take your job.

If the end result of the global AI experiment is a crashed economy with unnecessary data centres hogging water and power offering little benefit beyond faster code deployments and terribly written, inaccurate reports that humans have to fix manually, I don't think the tech bro CEOs should be too surprised if the rest of us on the planet get a bit miffed. No wonder they're all buying up doomsday properties in New Zealand. Now there's a safe investment.

work@nicolekobie.com

Home working isn't a "benefit"

If Barry Collins' employers want evidence he's away from his desk, they need only put a keylogger on his kettle. Email him at barry@mediabc.co.uk.
@bazzacollins

Draconian attitudes to working from home are a bigger problem than stay-at-home slackers

There's a crystal-clear indicator of whether I'm being productive when I work from home – it's whether my invoices are paid at the end of the month. As generous as Tim doubtless is, the hard-nosed Alan Sugar side of him wouldn't settle my invoices if the news and features pages weren't filled with copy I'd written and edited. If I were sitting here playing *Football Manager* and watching *Bargain Hunt* all day, the Bank of Tim would decline payment.

So it always make me want to thump my head into the desk when I read stories of companies struggling to work out if employees are actually doing their jobs when they let them work from home. We're now five years on from the great work-from-home experiment that was Covid, and yet companies are still flailing around when it comes to measuring employees' output.

I've witnessed the wild extremes of demands being placed on employees working from home. I know of one home-working employee of a giant tech corp who's regularly expected to attend meetings in the middle of the night – 4.30am isn't unusual – because they're part of an international team and it's no great inconvenience to disturb their sleep. After all, their bed is only 20 feet from their home office.

At the other end of the scale, a friend of mine worked from home for a company who gave him absolutely nothing to do for days on end. He would complain to his bosses, begging to be assigned tasks to alleviate the tedium, but was told to do nothing but sit by his laptop and wait for work to drop. He was part of a team of 20, and he didn't believe any of his colleagues were any busier than he was.

> "A friend of mine worked from home for a company who gave him absolutely nothing to do for days on end"

Between those mad extremes are tons of companies struggling to work out how to keep tabs on employees who aren't at HQ. Employers such as Greater Manchester Police (GMP), who recently concluded an "anti-corruption investigation" into 26 of its home-working employees. It was discovered that some of the police officers, staff and contractors working from home had been using key jammers to make it look like they were at their laptops when they weren't.

In a similar case, as reported by The Register, a detective in the Durham constabulary was fired after the keylogging software on his computer showed lengthy periods where the only activity recorded was a single key pressed multiple times. In one 90-minute period, it recorded 16,000 strokes of the "I" key alone.

The Durham work-dodger was fired, while GMP announced it was revoking work-from-home "privileges" for the entire force while further investigations were carried out. While I'm absolutely not condoning the conduct of the work-shy key-jammers, there's surely a bigger problem here than a couple of dozen staff trying to cheat the system.

First, the system stinks. If the only reliable measure you've got of whether someone is doing the job they're paid for is keylogging software, you're in a world of pain. Employee performance should be measured by output, not whether they're sat in front of their laptop for the prescribed hours. The investigation into the Durham officer found that he'd used "key jamming for 45 hours out of a total of 85 that he was logged in for" and that "he was frequently away from the keyboard for half of his working day".

> "If the only reliable measure you've got of whether someone is doing the job they're paid for is keylogging software, you're in a world of pain"

If it wasn't already obvious that his output was below the expected level, something's gone wrong. Perhaps the Durham Constabulary already had concerns over his performance and the keylogging was used as supporting evidence, but that's not clear from the report. Indeed, a statement from the sacked officer's supervisor said he felt "let down and embarrassed" by the officer's actions, as if the keylogging evidence caught them all by surprise.

But what stuck in my craw was the attitude that home working is some kind of perk, with the supervisor lamenting the officer cheating despite being given the "opportunity and benefit of working from home" – similar sentiments to GMP removing the "privilege" of working from home, like an entire class of schoolchildren being kept in at lunchtime because a few classmates hadn't done their homework.

Working isn't a "benefit" nor a "privilege", no matter where it's done. It's a none-too-subtle indicator that the employer thinks only *real* work is done in the office and that those working from home are cheating a living or getting a better deal than those who commute in each day. That lack of respect is further amplified by the installation of keylogging software, which the employees clearly knew about, or else they wouldn't have used key jammers in the first place.

If you show home workers such little respect and treat them like untrustworthy scroungers, is it any wonder that some live up to the image?

barry@mediabc.co.uk

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Emlyn Mousley

★★★★★
Service is top notch
I have been with 20i for a few years now. The service is top notch, their dashboard is absolutely amazing and what is most important is that their support is second to none.
Ante Drnasin

★★★★★
Best hosting company ever
I've been building websites for 26 years. This company is hands down the best host I've ever used. The support is phenomenal, the control panel is a delight to use, and the features are so comprehensive.
Adam

★★★★★
I honestly couldn't recommend 20i enough
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Callum D

★★★★★
An unparalleled service, experience and support!
Their support is amazing and it's like having an extension to our own team. Hands down the most caring and best hosting support team.
Ashley B

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Darren Strudwick

★★★★★
Incredible service!
I have been a customer of 20i for many years, and you wouldn't pay me to leave them. Having used many of the other well-known hosting companies in the past, I can tell you hand-on-heart, they are embarrassing compared to the extremely high standards that 20i adheres to.
Verified User

★★★★★
Excellent Reseller Hosting Experience
The platform is incredibly user-friendly, making it easy to manage multiple hosting accounts. With 20i's intuitive control panel, I can easily create, modify and monitor my clients' websites, domains and email accounts.
Verified User

★★★★★
Incredible support and service
I honestly can't fault 20i. Every time I've needed help, they've been so quick to respond and always go above and beyond to sort things out. They're helpful, friendly, and really know their stuff. It's rare to get this level of support these days — genuinely fantastic team and service
David Baaye

★★★★★
Affordable, Fast and Helpful
I thought it was affordable for what I use it for then I found out I can create my own shop right from the dashboard. Everything is easy to find and use. The support is quick, very human and easy to understand.
Sarah M

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Readers' comments

Your views and feedback from email and the web

Disposable printers

I thought Barry Collins treated printers a little casually in "Wipe all your devices" (*see issue 374, p26*). Modern printers aren't dumb appendages; they're computers in their own right, and the more sophisticated they are, the more complexity in their operations. And there have been plenty of stories about their vulnerabilities over the years.

Some have non-volatile memory and may use it for storing your images while they manipulate them for printing. (Some have been known to hallucinate about what you were trying to print in an excess of zeal for economy of effort.)

Best to perform a factory reset before letting go of a printer.

David Singer

News and features editor Barry Collins replies: I couldn't agree more! To the extent that my advice was indeed to use the factory reset before disposing of them – advice, however, that bears repeating!

Where art thou, Qualcomm?

Being a big fan of mini computing I looked forward to your mini PC labs (*see issue 374, p78*) but I was surprised that not a single PC used a Qualcomm chip. I thought Qualcomm was the new darling of the mini PC world. Has interest fizzled out or have Intel and AMD finally overtaken them?

Mike Halsey

Editor-in-chief Tim Danton replies: I think we're a year too early to see enough confidence in Qualcomm for mini PC manufacturers to volunteer to send them in for group tests. I spoke to Qualcomm at the launch of the Snapdragon X2 Elite (*see p10*), though, and it said it's in talks with manufacturers based on its reference designs – think units that slot into the base of monitors and even a frisbee-shaped device.

ABOVE Qualcomm's Snapdragon X2 Elite could be appearing in mini PCs very soon

Chrome Flexy time?

Your recent sidebar discussion in the mini PCs Labs regarding the limited variety of Chromebox form factors overlooks a significant point: users interested in running ChromeOS on a mini PC are free to do so. ChromeOS Flex is available as a free download, installs in less than a minute, and offers a more satisfying experience than attempting to run Windows 11 on tightly specced machines, given its design for minimal hardware. The only notable drawback is the lack of Android app support on Flex devices, but this is largely mitigated by the ease with which Linux apps can be enabled.

The idea that hardware must exclusively run its pre-installed operating system is becoming obsolete. It's more practical to align your OS platform with the specific task at hand, rather than being restricted by the hardware's default operating system.

James Masterton

Rubbish 5G

I was very interested to read the article "Rubbishing the UK's 5G coverage" (*see issue 373, p12*). I don't understand why we pay such high mobile data charges for such poor performance here in the UK. I frequently stand by my car for ages waiting for RingGo to connect despite living in London's Zone 2.

There are streets in the area 100m or less from visible masts where 5G signal strength struggles to hit one bar. Using the Speedtest app gives varied results but rarely anything approaching the theoretical speeds of 5G or even 4G; maybe 30Mbits/sec on a good day but typically 3-5Mbits/sec. Data over 3G appears to have in effect been switched off, which sucks when there are so many dark spots for 4G and 5G and smacks of cheapness on the part of the operators.

On a recent trip to Estoril in Portugal, just outside Lisbon, I ran a series of Speedtest tests in the street (sad, I know) and repeatedly got around 80-100Mbits/sec with a

Star letter

Password pains

I'm getting increasingly frustrated with passwords. When entering them, why am I presented with a row of asterisks? Who are they protecting my password from? Me?

I understand that there are times when you need to protect your password from prying eyes, so why not have a tick box to say if you want your password protected in this way, otherwise it's in clear text?

With password requirements becoming more complex, it means that I often make a mistake when I enter a password but I can't see what I've typed – I just get the "Your username or password is incorrect" message.

A particular irritation is when setting up a new account. The password field is still obscured by asterisks. WHY?!

For example, I opened a new account with an energy supplier when I switched. The password had to be at least 11 characters, at least one capital letter, at least one number and at least one special character – but as I typed it in I couldn't see it, much less copy it, and I have to hope I remember it and type it in correctly when I log on again.

Okay, there are password managers – but that means trusting your login details to a third party, where the idea is that all your login credentials are managed by them, with a single (and presumably hackable) password giving access to all of them.

So, back to my original question: why, when entering a password, is it hidden from me? It seems that someone back in the mists of time thought this was a good idea, and then everyone followed like sheep without actually thinking about it.

Brian Jones

Contributing editor Davey Winder replies: This is a typical example of bad UI design by someone who thinks they're aiding security when, just as with blocking cut and paste of a password, they're achieving the exact opposite by making it harder than it should be. Most sites should enable a "show password" view, but for those that don't, the best solution is to use a password manager and use the autofill option, even for new accounts.

This month's star letter writer wins a Cherry Stream Desktop Comfort keyboard and mouse wireless set, worth £80. For a chance to win, email letters@pcpro.co.uk

single-digit ping time whatever the time of day. 5G signal strength was almost always four bars.

I have long felt we are being hugely short-changed by the mobile phone operators here in the UK, and it was satisfying (if depressing) to see this confirmed in the above-mentioned article. Sadly I don't expect this to change any time soon.

Chris Jones

Junk email

Dick Pountain's recent article "The PC will never be collectable" (*see issue 373, p20*) struck a chord for I, too, have a pile of old "digital junk" that nobody wants. Fortunately, it doesn't fill a room, but a fair corner of my loft, as I discovered when I trawled through it last year. Even I was surprised at what I'd kept. The oldest item is a Sinclair ZX81, the newest a 2014 iMac; in between lie an Acorn Electron, a Psion II, a Psion 3a (with modem), several laptops, a Palm Tungsten 5 PDA, a Sony Clié PDA, a large box full of assorted leads and adapters, and several boxes of software. The latter includes both magazine cover discs and assorted commercial packages (including WordPerfect, Borland Paradox, Quattro and MathCAD), most in their original packaging.

I've contacted all the UK computer museums I've been able to find and, apart from Bletchley Park wanting one of my Electron accessories, drawn a blank. I live in north-east Scotland and even offered to deliver it if anyone would take it. I suspect that, once I've shuffled off this mortal coil, the whole pile will go the same way. Shame, as I can echo Dick's sentiments.

Steve Coles

Amstrad power

I was interested to read David Crookes' article on the Amstrad 8256 (*see issue 372, p123*). Alan Sugar had the genius to know what the public wanted and could make it. When the 8256 came out I saw a machine that did something and went out and bought one. It showed me what IT could do and motivated me to learn as much as I could. I even wrote a program in CP/M!

I went on to earn my living from using and teaching IT day to day so it transformed my life, as I'm sure it did for many others. Yes, Mr Crookes, it's perhaps not the most exciting retro machine, but certainly for me it is far more important than all the fun ones.

Richard Woollacott

Readers' poll

We asked readers across Discord, Facebook and X to name their favourite tech brand...

While Apple was the clear winner, it was equally clear that our readers weren't voting simply because of the company's slick marketing. "I'm not an Apple fanboy but have gradually accepted the expensive choice on the grounds that it's all really good kit," wrote Harry Parsonage on Facebook, for example. "I've had Android phones but have been with iPhones for a long time now and wouldn't change. I'm typing on a 12.9in iPad Pro that's five years old and still brilliant."

Harry was also a victim of the Windows 11 trap, where his high-spec laptop and desktop "weren't up to scratch", pushing him even further down the Apple route with an M4 Mac mini.

Fairphone stole second place, with Iain Clarke explaining the reason for his loyalty on Discord. "They're not perfect in all ways – their first phone's screen was too breakable as it wasn't the super duper-est Gorilla Glass, but it was repairable – but they're one of the few companies that we can feel a clear conscience buying from." Geoff Campbell rapidly agreed, before controversially opting for Microsoft as his second place choice.

Finally we go to "metaphase" on Discord. "A vote for Raspberry Pi here – was going to say Framework as I love what they're doing but I haven't actually bought any of their kit yet (albeit near top of the list for my next laptop), whereas I've bought a lot of RPi stuff! Really likely the variety of hardware they have on offer as well as solid software support/community/educational resources." They publish pretty good books, too.

"For me, that's like asking for my favourite brand of spade. They're tools to do a job – the name on the shaft is irrelevant." John Moore

"Synology! Been using its NAS kit for years and it's so easy to set up and use" Kevin Price

"To my shame, Apple. It's true that 'it just works'." Peter Jones

"I'll go for Dell. I have four of its monitors and I fully expect them to last over a decade. They're superb." John Wright

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PC PRO TECHNOLOGY EXCELLENCE AWARDS 2025 WINNERS

PC PRO TECHNOLOGY EXCELLENCE AWARDS 2025

Whether you want to buy a product today or next year, make sure you keep this reference to hand: the experience of over 5,000 people can't be ignored

At some point, we must really let AI loose on the amazing amount of data we have about customer service in the UK. The *PC Pro* Technology Excellence Awards have been running for almost three decades, a period of history that has seen the launch of the iPod, Facebook and ChatGPT.

During that time, several companies have achieved a level of consistency that puts Novak Djokovic to shame. Zen has pocketed almost 40 awards over the years, including an extra one this year for the all-new Digital Voice category. Brother and DrayTek are also well into double figures. That's an incredible achievement for all concerned and testament to the priority each company gives to customer support and product quality.

If only we could say the same for companies that come perennially near the bottom of our table. We won't name and shame for fear of the lawyers' letters (we've had a few of those over the years as well), but as with every year we advise you look carefully: is there a reason why that product is so cheap?

We couldn't produce these detailed reports without your time and patience, with over 5,000 people filling in our survey. Thank you! You make the awards what they are. And, as you're so wise, perhaps you can help. Despite being almost 30 years old, we still haven't figured out a Brits, Oscars or Emmys-style shortening of the awards name to propel them into the mainstream. Techies? Props? Proxies? Answers on a postcard, or even better by emailing letters@pcpro.co.uk.

CONTRIBUTORS: Tim Danton, Barry Collins and 5,354 readers and customers

CONTENTS

Best PC manufacturer 27
Best laptop manufacturer 28
Best tablet manufacturer 28
Best phone manufacturer 29
Best mobile data provider 29
Best monitor manufacturer 30
Best router manufacturer 30
Best printer manufacturer 31
Best NAS manufacturer 31
Best smartwatch manufacturer 31
Best online retailer 32
Best broadband ISP 32
Best web host 33
Best cloud storage 33
Best digital voice supplier 33

PRODUCTS OF THE YEAR

Laptop of the year 34
Desktop PC of the year 34
Business software of the year 34
Security software of the year 34
Workstation of the year 36
Phone of the year 36
Security hardware of the year 36
Business laptop of the year 36
Business hardware of the year 37
Business Innovation Award 37
Innovation Excellence Award 37
Chromebook of the year 37
Mobile workstation of the year 38
Mini PC of the year 38
Sustainability Excellence Award 38
Business Chromebook of the year 38

BEST PC MANUFACTURER

● **WINNER** PCSPECIALIST ● **HIGHLY COMMENDED** APPLE

It should be no surprise that British PC makers claim three of the top four positions in our satisfaction charts, as this is a pattern we've seen for many years. While we're not pretending that everyone has a perfect experience, we repeatedly hear praise for the customisation options, the ordering process and the reassuring levels of presales and post-sales support.

This year it's Wakefield-based PCSpecialist that takes top spot from its rivals. "The ordering and build process was seamless, with constant updates, and the delivery was carefully planned to ensure I was in," wrote David Hall. John Oliver, who had previously bought off-the-shelf PCs, was equally impressed: "I got everything I wanted and not lots of things I didn't. We scoped the machine, they built it and have maintained it since. Good prices and fast service."

Apple customers such as John Clarke are similarly pleased with their purchases. "Nice-looking kit and free 30min video call to help set up and explore features was amazing," he wrote. Elsewhere, the Mac mini drew particular praise for its power in a small form factor. "Mac mini is brilliant in a tiny footprint," wrote James Chick, for example, and even though we heard plenty of complaints about the cost of upgrades the 98% "buy again" rate says it all. If the price is too high, note that several of our happiest Apple customers bought secondhand machines.

	CUSTOMER SUPPORT	RELIABILITY	VALUE FOR MONEY	SPEED	BUY AGAIN?	OVERALL
PCSPECIALIST	95%	94%	90%	95%	97%	94%
APPLE	90%	96%	83%	95%	98%	93%
CHILLBLAST	87%	93%	89%	95%	94%	92%
SCAN	93%	91%	86%	94%	90%	91%
DELL	80%	90%	88%	89%	97%	89%
ASUS	84%	88%	85%	88%	96%	88%
ACER	77%	91%	83%	85%	100%	87%
LENOVO	76%	87%	89%	86%	94%	86%
HP	78%	84%	82%	83%	92%	84%

Elsewhere, UK manufacturers drew most praise. Consider this from James Murphy. "Had the infamous Intel i9-13000 CPU failure. Scan support in fixing it was exceptional. They tested it within 24hrs of return, upgraded the replacement to i9-14000 *and* shipped back to me before 10.30am the following day all at no extra cost."

Chillblast has its fair share of loyal customers, too, with Paul Sutton describing it as an "excellent company that I have used for over 20 years", while Rod Saunders said: "My third desktop from Chillblast. The first bought in 2013 died of a CPU fan failure in May, and the 2018 model is still OK. The new desktop was ordered and delivered the next day."

Two companies fell just short of our minimum 25 respondents, which is a shame for both Geekom and CyberPowerPC as they would have been in the mix. Likewise Wired2Fire. There are also encouraging signs for Acer, with 100% of its customers telling us they would buy from the company – despite comparatively low satisfaction levels for customer support. That last result is something it shares with HP, which takes bottom position of the desktop PC table for the second year in a row.

HOW **YOU** DECIDE THE WINNERS

You probably know the drill by now: *PC Pro* doesn't decide the winners of the Technology Excellence Awards – you do. It's thanks to thousands of readers taking part in our detailed survey, across three months, that we can generate the detailed tables you see on these pages.

Fundamentally, we aim to gauge your levels of satisfaction with the companies whose products you buy. When it comes to printers, how satisfied are you with print quality? Or the reliability of your broadband? How happy are you with the photos your phone produces?

We then crunch the figures to create the percentage scores you see in the tables, The maximum score a company can receive is 100%, where a reader declares themselves to be "very satisfied" with, for instance, customer support for their desktop PC. If they select "satisfied", that's a score of 80%. And so on, until they reach "very dissatisfied", which is 0%. So a score of 90% could be 50 people saying "very satisfied" (100%) and 50 "satisfied" (80%).

For companies to appear in our tables, they must have at least 25 respondents. We also use methods to protect against "stuffing" or other manipulation where a manufacturer may try to bias results by encouraging only positive feedback. This year, we (together with an independent consultant) spent over two weeks analysing the data, looking for anomalous results and discarding those entries. As a consequence, we believe that the scores you see are ones you can trust.

From p34, we also publish our own Products of the Year. Chosen by *PC Pro* writers and editors, these are the standout products and services – from Chromebooks to workstations – from the hundreds we've tested over the past 12 months.

BEST LAPTOP MANUFACTURER

WINNER APPLE ● **HIGHLY COMMENDED** PCSPECIALIST

With a clean sweep across four categories, it's little wonder that Apple once again tops our table of laptop makers. However, it's less good news for Microsoft and Samsung: those companies claimed second and third spots last year, but this time a drop in user satisfaction for both customer support and reliability pushes them down towards the bottom. HP at least shows consistency by taking the second-bottom position for two years in a row.

We'll come to our winners in a moment, but first must praise Acer, Dell and Lenovo for improving on last year's results. Unlike Apple, which only produces premium products, these companies offer laptops at all price ranges, so it's inevitable they won't score as highly for reliability, speed or battery life. However, solid levels of support and good value ratings mean that over 90% of their customers would buy from them again.

Unless you recall last year, when PCSpecialist won a special "Best of British Laptops" award, the presence of a British laptop maker may be a surprise. After all, it doesn't design its own machines but takes existing designs from China and Taiwan before customising them in the UK. "The price-performance ratio from PCSpecialist is unbeatable," wrote David Montanya. "I love that you can customise your build 100%." While the user experience isn't always as slick as the big laptop makers – Brandon Darby told us he would have appreciated a driver installation pack, for example – you can't argue with a 94% rating for value for money.

	CUSTOMER SUPPORT	RELIABILITY	VALUE FOR MONEY	SPEED	BATTERY LIFE	BUY AGAIN?	OVERALL
APPLE	89%	96%	78%	94%	92%	98%	92%
PCSPECIALIST	89%	92%	94%	89%	81%	95%	90%
LENOVO	82%	88%	86%	85%	80%	94%	86%
ACER	79%	87%	87%	86%	79%	92%	85%
DELL	80%	87%	84%	85%	77%	94%	84%
ASUS	77%	85%	84%	88%	79%	91%	84%
MICROSOFT	76%	87%	77%	84%	83%	96%	84%
HP	76%	87%	84%	83%	79%	93%	84%
SAMSUNG	76%	85%	79%	85%	78%	90%	82%

You can probably guess the comments from MacBook buyers, which we can simplify to top-quality hardware, great performance and battery life – and expensive if you want more than the baseline RAM and SSD amounts. But boy are they loyal. "I switched from Windows to my MacBook Pro," wrote Alastair MacLeod. "Night and day. Would never go back. Once you're used to the differences it's better in literally every way." Or as Howard Porter said: "Wasn't there a song about Apple? You're simply the best."

BEST TABLET MANUFACTURER

WINNER APPLE ● **HIGHLY COMMENDED** SAMSUNG ● **BEST VALUE** HONOR

There's remarkable consistency in the scores for both Apple and Samsung between last year's awards and this – and once again it's the iPads that win.

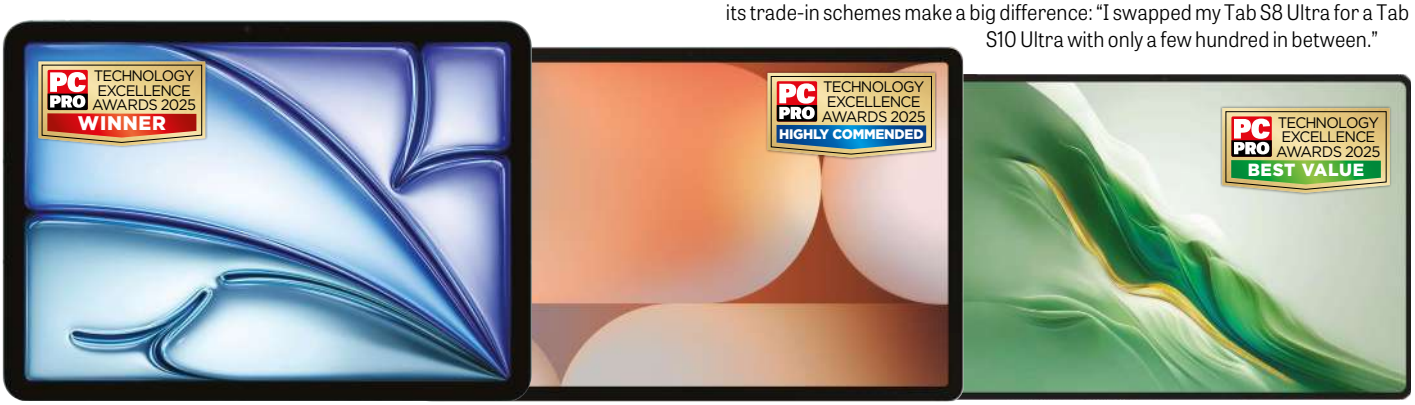
Apple's satisfaction scores are top notch. If there's a faint glimmer of hope for Apple's rivals, it's the value for money that leaves buyers concerned, with Apple scoring worse than all of its four rivals in this category.

"iPads are good, but the prices are creeping up and they're not really changing much other than the chip," said Sam Kay. "I wish I could afford a larger screen version but prices on Apple products are really unacceptably high," agreed Frances Day.

Honor was a new entrant in this year's awards, and sweeps in to claim the best value crown. As with all Android manufacturers, it's the choice of apps that brings their scores down, with none capable of matching the Apple App Store. Amazon customers are the least satisfied in this regard. "Bit slow, shortage of apps," commented Brian Richardson, "but bought in sale so price was good."

Samsung can't match Honor for value, but David Montanya pointed out that its trade-in schemes make a big difference: "I swapped my Tab S8 Ultra for a Tab S10 Ultra with only a few hundred in between."

	CUSTOMER SUPPORT	RELIABILITY	VALUE FOR MONEY	SPEED	BATTERY LIFE	SOFTWARE AND ACCESSORIES	BUY AGAIN?	OVERALL
APPLE	86%	94%	78%	91%	84%	85%	96%	88%
SAMSUNG	78%	90%	85%	84%	83%	81%	96%	85%
HONOR	73%	90%	93%	88%	82%	73%	96%	85%
LENOVO	79%	85%	86%	79%	76%	77%	88%	82%
AMAZON	72%	84%	86%	77%	81%	61%	72%	76%



BEST PHONE MANUFACTURER

WINNER ONEPLUS **HIGHLY COMMENDED** HONOR **BEST VALUE** XIAOMI

It's perhaps a sign of the economic times that Apple finds itself sliding down the table in this year's phone award, slipping from second in 2024 to fourth this year. The main culprit? The worst value for money score of any manufacturer in this category. iPhones are great, as the rest of the scores confirm, but they're expensive too. "Apple stuff tends to be more expensive than others, but you get what you pay for," as reader Nigel Strudwick confirms.

	CUSTOMER SUPPORT	RELIABILITY	VALUE FOR MONEY	SPEED	BATTERY LIFE	CAMERA QUALITY	BUY AGAIN?	OVERALL
ONEPLUS	81%	96%	93%	97%	97%	85%	100%	93%
HONOR	85%	89%	93%	93%	88%	89%	96%	90%
XIAOMI	81%	93%	94%	89%	85%	84%	94%	89%
APPLE	85%	93%	73%	90%	81%	90%	98%	87%
GOOGLE	79%	90%	84%	89%	80%	92%	96%	87%
SAMSUNG	80%	90%	81%	89%	82%	88%	97%	87%
MOTOROLA	70%	88%	90%	83%	83%	79%	92%	84%

There's no such concern over value for OnePlus, which retains the main award in this category. "This is the fourth device we have as a family purchased, and the combination of performance, battery life and also a nice, lightly extended OS are just a perfect combination," said reader Paul Bamberger.

Honor pushed OnePlus close for the top award, having to settle for a second successive highly commended award instead. It scored well for value and speed, and scored over 85% in every category – a feat of consistency unmatched by any other manufacturer in this year's awards.

Xiaomi narrowly pipped OnePlus and Honor for value, with a healthy 94% of customers praising the Chinese manufacturer in this regard.

Although it was a tightly contested category, Motorola will be disappointed to finish bottom of the pile with a still-respectable overall score of 84%. Customer support appears to be letting Motorola down, with only 70% praising the service on offer – the lowest score of any manufacturer by quite a margin.

However, a 90% value for money score betrays Motorola's low-budget approach. "Good price for a smartphone," said Susan Caygill. "I don't believe in paying stupid money for a phone."

BEST MOBILE DATA PROVIDER

WINNER GIFFGAFF **HIGHLY COMMENDED** LEBARA **BEST VALUE** SMARTY

Mobile data has become one of the most competitive awards categories we have, with 15 companies generating enough responses to be listed in our table, and not much to separate the brands at the top of the pile.

This year it's a return to the winner's podium for Giffgaff, with last year's title holder 1pMobile dropping back slightly (albeit still with very decent scores). Value is the strongest card for providers at the top of the table, and normally the weakest for the firms the virtual networks buy connections from: O2, Vodafone, Three and EE.

"In three years, Giffgaff has never put its price up, but it has doubled my data allowance," said Rob Crabtree. "Other carriers put prices up annually with no service enhancements." Dominic Staples' endorsement could hardly be stronger, telling us he had "over ten active SIM cards with Giffgaff as I cover multiple devices for my family. Its phone offerings are excellent for people such as me that prefer to buy outright to save money."

Lebara moves up the table to claim a highly commended, with 95% of customers praising the value for money they receive. But just nudging ahead on the value score is Smarty, with 96% of its customers satisfied that they're not paying over the top.

It's clear there's no compelling reason to stick with the well-known networks. With the Vodafone/Three merger reducing the number of major networks to only three, let's hope that doesn't have a negative effect on the virtual networks they're piggybacking on.

	CUSTOMER SUPPORT	RELIABILITY	VALUE FOR MONEY	SPEED	4G COVERAGE*	5G COVERAGE*	RECOMMEND?	OVERALL
GIFFGAFF	83%	90%	94%	87%	83%	72%	97%	87%
LEBARA	82%	89%	95%	87%	82%	71%	95%	86%
SMARTY	81%	87%	96%	87%	79%	72%	96%	86%
TESCO MOBILE	87%	88%	89%	85%	80%	70%	94%	85%
1PMOBILE	77%	86%	82%	84%	84%	80%	90%	83%
ID MOBILE	76%	84%	92%	84%	82%	73%	90%	83%
TALKMOBILE	82%	87%	91%	82%	75%	64%	92%	82%
VOXI	73%	85%	90%	80%	72%	60%	89%	78%
ASDA MOBILE	75%	82%	89%	73%	65%	61%	97%	77%
SKY	74%	81%	76%	76%	73%	61%	84%	75%
EE	73%	80%	71%	78%	75%	67%	80%	75%
O2	70%	77%	70%	73%	70%	59%	74%	70%
VODAFONE	68%	76%	68%	73%	70%	58%	76%	70%
THREE	69%	72%	75%	71%	68%	58%	72%	69%
BT MOBILE	66%	72%	61%	65%	70%	63%	60%	65%

*As with all categories, 4G and 5G coverage is a reflection of people's satisfaction, not an objective rating of how good the service is.

BEST MONITOR MANUFACTURER

WINNER BENQ **BEST VALUE** IIYAMA

We have excellent news for anyone buying a monitor: the average level of satisfaction among our readers is incredibly high, with seven companies earning overall ratings over 90%. To put it another way, a 91% satisfaction rate would have made Acer, Dell and MSI award winners in most other categories, but here they must make do with a congratulatory slap on the shoulder for a job well done.

The main honours go to BenQ, which topped the table for both reliability and image quality, with 100% of its customers happy to buy another monitor. Customers such as Paul Corcoran. "All the BenQ monitors I have bought are still working regardless of how old they are," he told us. "All the Samsung Smart Monitors I have bought have failed." Robert Danskin was equally enthusiastic. "This was a BenQ Photographers monitor, so the ability to support the Adobe 1998 colour palette and calibration were critical factors in monitor choice."

Iiyama is another regular winner in our Excellence Awards, and again it's easy to see why when you read through people's comments. "I've used Iiyama monitors for decades, as staggering as that statement may be, and they are always excellent," wrote Paul Bamberger. A point of view echoed by Stuart Crossin: "Great screen and technology from Iiyama as always. Smooth and friendly user interface, too. I've used Iiyama screens for several years now and always been satisfied."

	CUSTOMER SUPPORT	RELIABILITY	VALUE FOR MONEY	IMAGE QUALITY	BUY AGAIN?	OVERALL
BENQ	83%	96%	93%	97%	100%	94%
IIYAMA	83%	95%	94%	95%	98%	93%
ASUS	85%	92%	91%	95%	98%	92%
MSI	84%	91%	90%	94%	95%	91%
DELL	82%	92%	88%	93%	99%	91%
ACER	82%	94%	91%	89%	97%	91%
SAMSUNG	79%	91%	85%	92%	93%	88%
AOC	72%	87%	88%	87%	94%	85%
LG	74%	87%	86%	91%	89%	85%
HP	78%	89%	81%	84%	91%	84%

Both BenQ and Iiyama are imaging specialists, so kudos must also go to Asus for pushing them so hard in third place. "I've bought two Asus monitors from the ProArt range – these 27in displays are magnificent," wrote Peter Baker. "I can actually see what I'm supposed to be looking at. Quite probably the best computer-related purchase I've made in the last 20 years."

BEST ROUTER MANUFACTURER

WINNERS DRAYTEK, UBIQUITI **HIGHLY COMMENDED** FRITZ!BOX

There's arguably no more important piece of tech in your home than the wireless router – get that decision wrong and almost every other piece of kit will suffer. If you're thinking about upgrading your router, picking a company where every single one of its customers said they would happily buy from them again would seem a sensible choice. And we've got two of them in this awards category, with both Ubiquiti and DrayTek scoring so highly that we couldn't separate them.

Ubiquiti has the slight edge on its rival for speed and range. "For me, [Ubiquiti] UniFi is the only choice in home router hardware," said Andy Beaney. "Prosumer products at consumer prices, and a clean, well-thought-out UI that's constantly updated with fixes and features (even years later – my last device was over five years old)."

However, DrayTek counter-punches with better scores for value and support, as emphasised by reader David Hewitt. "I had a slight problem setting up and the online support was excellent," he said of his DrayTek router. "It replaced a ten-year-old DrayTek router that had been trouble-free but I wanted mesh."

	CUSTOMER SUPPORT	RELIABILITY	VALUE FOR MONEY	SPEED	RANGE	BUY AGAIN?	OVERALL
UBIQUITI	84%	96%	88%	96%	95%	100%	93%
DRAYTEK	91%	96%	89%	94%	89%	100%	93%
FRITZ!BOX	91%	93%	89%	92%	85%	95%	91%
TP-LINK	82%	90%	87%	90%	86%	95%	88%
AMAZON EERO	87%	89%	80%	93%	85%	93%	88%
NETGEAR	80%	88%	77%	89%	89%	97%	87%
ASUS	69%	90%	79%	94%	91%	94%	86%

The highly commended and punctuationally challenged Fritz!Box is the manufacturer of routers supplied by perennial broadband award winner, Zen, making the pair a very attractive proposition. Anthony Carter was one of many readers who mentioned they had bought extenders or combined Fritz!Box routers into a mesh system to overcome limitations with range. "Zen supplied the router, I purchased two repeaters to make a mesh system," he said. "It cured a lot of handover problems with my Samsung phones."

BEST PRINTER MANUFACTURER

WINNER BROTHER

One figure stands out here: a stunning 98% of Brother customers would buy the brand again. No wonder it's won Best Printer Manufacturer for 12 years in a row. "Impressive, in a word," wrote Mark Faulkes. "Setup of the printer was a breeze, it's fast, and I love the ability to scan and print large A3." Lewis Craik agreed, saying "it is amazing to have a printer that just works!"

Others praised the affordability of Brother's "genuine" inks, a subject that came up a lot from Epson customers. "Like most manufacturers, Epson inkjet cartridges are very expensive compared to third-party ones," said Geoff Milnes. However, one reason why Epson claimed second place is the success of its EcoTank devices, which use refillable ink tanks. "I love EcoTank printers," Julian Hermele told us. "Not only are they much cheaper to run but also there is no need to waste time replacing ink cartridges."

	CUSTOMER SUPPORT	RELIABILITY	VALUE FOR MONEY	PRINT QUALITY	BUY AGAIN?	OVERALL
BROTHER	80%	92%	91%	90%	98%	90%
EPSON	77%	87%	85%	89%	94%	87%
XEROX	84%	86%	81%	89%	87%	85%
CANON	77%	84%	79%	86%	94%	84%
HP	72%	77%	77%	84%	89%	80%

Canon and Xerox duked it out for third place, with Xerox ultimately winning for its customer support ("second to none", wrote Byron Simmonds) and print quality. "They just make such good printers!" exclaimed Ethan Nunn. "Toner is expensive but lasts ages and the print quality from Xerox is always brilliant."

HP came bottom this year, with many mutterings about the cost of ink and tie-in to HP inks (although many appreciate the Instant Ink scheme). But the best comment came from Matthew Jackson: "The printer is fine for my needs but it drinks ink like students at a free bar."

BEST NAS MANUFACTURER

WINNER QNAP

We need feedback from at least 25 people before including a company in our awards, meaning that Asustor and Western Digital miss out on a chance to win this year – although we can say that feedback from Asustor customers was promising. Still, it would have struggled to intervene in the annual battle between its fellow Taiwanese NAS supremos Synology and QNAP to win this award, with QNAP ultimately winning for its ecosystem, reliability and speed.

"Being able to run the Mercedes file system ZFS on such a small NAS is terrific," wrote one reader, who preferred to remain anonymous. And while the subject of vulnerabilities discovered in late 2024 came up, the fact that QNAP responded immediately with patches – and urged its users to update – appears to have resulted in an uptick in its customer support rating, which improved from 89% to 92% this year.

	CUSTOMER SUPPORT	RELIABILITY	VALUE FOR MONEY	SPEED	ECOSYSTEM	BUY AGAIN?	OVERALL
QNAP	92%	96%	82%	84%	90%	89%	89%
SYNOLOGY	79%	92%	81%	82%	87%	89%	85%

While Synology couldn't match that level of customer satisfaction (several people mentioned the need to use Synology-branded drives in certain product lines), people remain positive about both the hardware and software. "Long-term Synology buyer and have always been impressed at how easy they are to manage and the software environment," wrote Martin Gorrod. "Synology stuff just works," added Peter Baker. "I bought a D723+ to replace a DS212j that finally died after 12 years' use."

BEST SMARTWATCH MANUFACTURER

WINNER HUAWEI **HIGHLY COMMENDED** APPLE

If there's one thing that sets Huawei apart in this category, it's battery life. An emphatic 95% of its customers were satisfied with their smartwatch's battery life, with most other manufacturers registering scores in the 70-80% range.

Huawei is ahead when it comes to value, too, handing the company this year's award ahead of Apple. "The Huawei [watch] has proven excellent to date, linked to a OnePlus 9 Pro phone," said reader Neil Kirk. "Battery life is great and in-built apps are spot on."

"GT 4 watch has a great battery," agreed Stuart Baillie. "It lasts around two weeks." Given many watches still need to be hooked to a charger every day, that's some achievement.

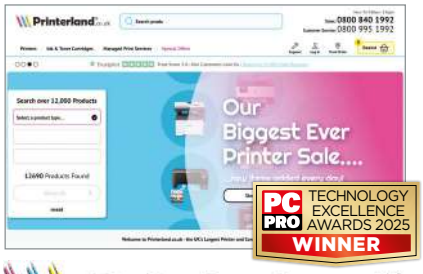
Several Apple Watch owners grumbled about battery life in their comments, reflected in a satisfaction score of only 73%, the second weakest of all the smartwatch manufacturers

	CUSTOMER SUPPORT	RELIABILITY	VALUE FOR MONEY	BATTERY LIFE	EASE OF USE	BUY AGAIN?	OVERALL
HUAWEI	82%	92%	94%	95%	88%	93%	91%
APPLE	89%	93%	81%	73%	89%	94%	87%
SAMSUNG	81%	89%	84%	76%	86%	93%	85%
GARMIN	77%	88%	81%	85%	79%	94%	84%
GOOGLE	80%	86%	82%	72%	84%	91%	82%
XIAOMI	70%	80%	87%	77%	81%	83%	80%
FITBIT	70%	78%	79%	79%	80%	72%	76%

here. However, it did win a lot of praise for the way it assists with health issues. "Very good for medical uses," said David Williams of his Apple Watch. "A great help to trying to stay fit and in control of my life," agreed Tim Greenall.

BEST ONLINE RETAILER

WINNER PRINTERLAND **HIGHLY COMMENDED** SCAN



Printerland will be breaking out the bubblejets after securing the best online retailer award for the second year on the spin. The company put in a strong set of scores across the board, in what is always an exceedingly tough award to win. When you're lowest score is 94%, you know you're doing something right.

"I like the comprehensive information available on printers that made it easy to come to a decision on which one to buy," said customer Malcolm Chisholm.

"Actually had a call from a real person prior to dispatch to make sure I had ordered the kit which would completely meet my needs," said reader John Clarke, who we assume didn't get ChatGPT to fill in our reader survey. "Great surprise service."

Scan is a company that perennially scores highly in this award and it's only a hair's breadth behind Printerland this year, claiming a richly earned highly commended. It too (along with Broadbandbuyer) scored 90%+ in every category, with 98% of its customers happy to use the company again.

Scan is "one of the few remaining UK component sellers which has always been fast and reliable," said Andy Beaney. "Those who shop at Amazon should switch to companies like Scan as there are very few component sellers left."

"Have used Scan for years and will continue to as long as I'm needing computer parts," said David Angus. "Great stock and service!"

	OVERALL SATISFACTION	CUSTOMER SUPPORT	SPEED & QUALITY OF DELIVERY	USE AGAIN	OVERALL
PRINTERLAND	96%	94%	97%	98%	96%
SCAN	95%	93%	93%	98%	95%
BROADBANDBUYER	95%	90%	91%	99%	94%
JOHN LEWIS	93%	89%	91%	98%	93%
OVERCLOCKERS UK	92%	89%	91%	98%	92%
CCL	92%	88%	91%	95%	92%
EBUYER	89%	82%	88%	97%	89%
AMAZON	86%	78%	91%	98%	88%
ARGOS	88%	80%	87%	98%	88%
LAPTOPS DIRECT	87%	81%	87%	96%	88%
VERY	87%	83%	86%	93%	87%
CURRYS	82%	75%	82%	93%	83%
EBAY	83%	72%	77%	99%	83%
BOX	83%	79%	79%	89%	83%

Indeed, customer service is largely what distinguishes the winners from the also-rans in our online retailer award. Giants such as Amazon (78% satisfaction), Currys (75%) and eBay (72%) don't score anywhere near as highly as the award winners, suggesting the bigger companies struggle to deliver the level of personal service that customers of the award winners cherish and comment upon.

BEST BROADBAND ISP

WINNER ZEN

Zen's winning streak in this award continues for an unprecedented 22nd year. To put that into context, when Zen first won this award, Tony Blair was still only midway through his premiership, Jonny Wilkinson was winning the World Cup for England, and the first iPhone was still four years away.

As much as we'd love to see how some of the smaller "altnets" fared against the undisputed champion, we simply didn't get enough responses from any of them to make their results statistically sound. Consequently, Zen – by no means a corporate behemoth itself – continues to overshadow the bigger players in the industry, none of which even scored highly enough to merit a highly commended award.

"I chose Zen because of *PC Pro*'s recommendation," said reader Stuart Ellis. "I have not been disappointed. Better than Plusnet (who were good) and light years ahead of EE. I would happily pay more for their connections, as they are such a delight to deal with."

"When the line goes down in our road (we live among a lot of trees that keep attacking the lines), Zen always seems to have us up and running quicker than our BT-based neighbours," said Alan Ingram.

Vodafone is the closest competitor to Zen in this year's table, leapfrogging above Plusnet. Speed is starting to become one of the company's core strengths, as it's now offering connections of 2.2Gbits/sec in full-fibre areas, along with Wi-Fi 7 router equipment to go with it. However, support is still in need of a speed boost. "In the two years I've been with Vodafone, I've found the customer support very good," said reader Kenneth Driver, "but it takes too long to get to the right department to answer your query."

Vodafone falls just behind Virgin Media in terms of speed, putting Virgin second only to Zen in the speed rankings. But it's a familiar story with Virgin's failings, with lowly scores for both customer support (59%) and value for money (58%) dragging the company down to bottom spot with BT.

"Yes, yes, yes – we know they're annoying, have terrible customer service and a frustrating renewable rigmarole," said Virgin customer Martin Bailey, who we're tapping up to write next year's awards copy. "Their pricing structure is just a random number; no two customers ever pay the same price. But, when it works, it gives unwaveringly fast speeds."

	CUSTOMER SUPPORT	RELIABILITY	VALUE FOR MONEY	SPEED	RECOMMEND?	OVERALL
ZEN	95%	95%	90%	92%	97%	94%
VODAFONE	78%	83%	83%	82%	88%	83%
PLUSNET	78%	85%	78%	77%	85%	81%
EE	78%	81%	69%	76%	80%	77%
TALKTALK	66%	79%	71%	71%	78%	73%
SKY	73%	76%	63%	73%	74%	72%
BT	71%	76%	59%	71%	69%	69%
VIRGIN MEDIA	59%	74%	58%	83%	70%	69%

BEST WEB HOST

WINNER 20i **HIGHLY COMMENDED** ZEN

It's a third win on the trot for 20i, which is starting to rival Ant and Dec in terms of dominance of best host awards.

20i didn't score less than 97% in any of the voting categories, which is a quite exceptional performance. "I was wary of 20i from the start, but after using them for a little over a year now I can safely say that they have changed how I handle web hosting for both my own businesses and my clients," said Louis Ensell.

Zen is again highly commended, logging scores above 90% in every category, with the firm's renowned support earning 93% satisfaction.

"I like Zen as I'm able to talk to a technical person," said Hugh Dibley. "I find some of the systems a bit unfriendly/geeky, but this is more than offset by being able to contact them for verbal assistance."

	CUSTOMER SUPPORT	RELIABILITY	VALUE FOR MONEY	SPEED	RECOMMEND?	OVERALL
20i	99%	98%	97%	97%	99%	98%
ZEN	93%	93%	90%	91%	96%	93%
MICROSOFT (AZURE)	77%	88%	79%	84%	94%	84%
FASTHOSTS	83%	89%	78%	82%	88%	84%
IONOS	78%	86%	79%	82%	87%	83%
BT	83%	83%	81%	78%	84%	82%
GODADDY	77%	83%	67%	79%	88%	79%
WORDPRESS.COM	71%	81%	72%	80%	83%	77%
WIX	67%	83%	67%	81%	85%	77%
123 REG	72%	76%	71%	74%	73%	73%

BEST CLOUD STORAGE

WINNERS PROTON DRIVE, BACKBLAZE **HIGHLY COMMENDED** AMAZON S3

Having won this award all for itself in 2024, Backblaze is having to share the winner's podium this year with Proton Drive. Both companies racked up highly impressive scores, with Backblaze just nudging ahead for speed and value, but Proton fighting back for support and reliability. In the end, we couldn't separate them, so the award is shared.

There's a highly commended gong for Amazon's mantelpiece too, with its S3 service scoring well for reliability, in particular. Dropbox, meanwhile, has sunk to the bottom of our awards table. A company resting on its laurels, perhaps?

	CUSTOMER SUPPORT	RELIABILITY	VALUE FOR MONEY	SPEED	RECOMMEND?	OVERALL
PROTON DRIVE	91%	95%	88%	90%	93%	91%
BACKBLAZE	88%	94%	90%	91%	92%	91%
AMAZON S3	79%	92%	86%	88%	92%	88%
APPLE ICLOUD	79%	85%	77%	81%	90%	82%
GOOGLE DRIVE	74%	84%	80%	81%	90%	82%
AMAZON CLOUD DRIVE	77%	83%	77%	79%	86%	80%
BOX	68%	82%	80%	79%	89%	80%
MICROSOFT ONEDRIVE	70%	79%	76%	77%	83%	77%
DROPBOX	69%	81%	74%	78%	83%	77%

BEST DIGITAL VOICE SUPPLIER

WINNER ZEN

Digital Voice Supplier is a new category in this year's awards, and a very salient new entry given that Openreach is currently in the process of lopping off landlines across the country. But while it might be a new award, it's a name very familiar to *PC Pro* readers that tops the table.

Of the six companies that generated enough responses to warrant inclusion, Zen was head and shoulders above the rest. We suspect this is in part due to the excellent Fritz!Box equipment Zen supplies with its broadband lines, which makes adding digital voice services a doddle.

"If you want to keep landline with FTTP then go ahead," said reader Deepak Kalra of Zen's digital voice service. "Mine works fine and, if anything, voice quality is a bit better than on old copper line. It was very simple to set up."

Another reader praised Zen's ability to transfer existing landline numbers over to digital voice, something other providers had failed to do.

	CUSTOMER SUPPORT	RELIABILITY	VALUE FOR MONEY	AUDIO QUALITY	RECOMMEND?	OVERALL
ZEN INTERNET	91%	92%	89%	91%	96%	92%
VODAFONE	70%	78%	76%	80%	86%	78%
EE	78%	79%	72%	81%	79%	78%
SKY	73%	75%	67%	75%	77%	73%
BT	73%	76%	67%	74%	71%	72%
VIRGIN MEDIA	59%	72%	58%	73%	61%	65%

As with the broadband provider award, Vodafone puts up the strongest competition to Zen, even if it doesn't score highly enough to claim a highly commended. Vodafone should know a bit about the voice business given its pedigree, though many readers don't use the digital voice service that's bundled with their Vodafone broadband. Those that do seem to rate it reasonably well, with customer service dragging Vodafone's overall score southwards.

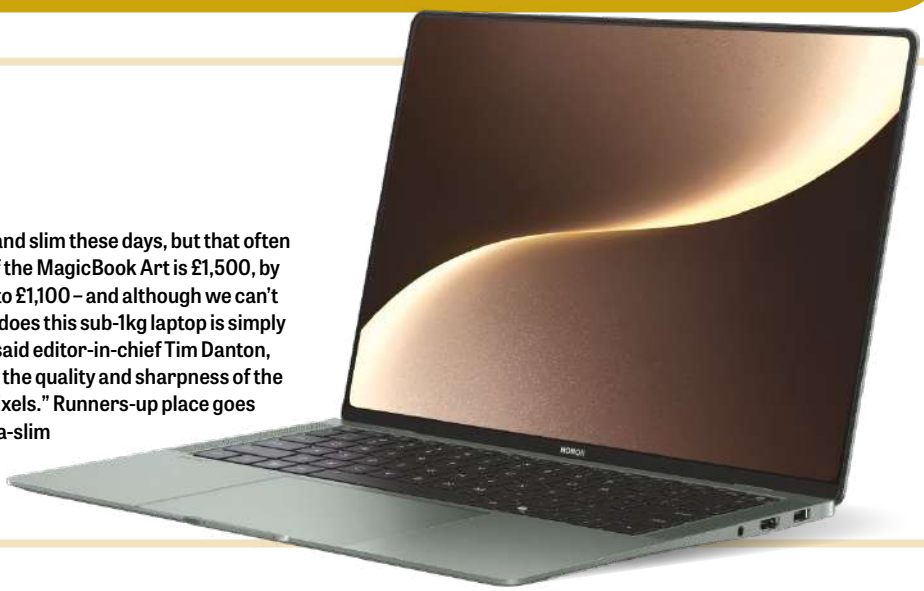
PRODUCTS OF THE YEAR

Out of the hundreds of products we reviewed in the past 12 months, these are the handful that stand out as the best – plus our picks for the most innovative companies

LAPTOP OF THE YEAR

WINNER HONOR MAGICBOOK ART 14 (2025)
HIGHLY COMMENDED LENOVO YOGA SLIM 7X

We're used to laptops being powerful, gorgeous and slim these days, but that often means a price to match. While the official price of the MagicBook Art is £1,500, by claiming a point-of-sale voucher the price drops to £1,100 – and although we can't guarantee that voucher will stay forever, while it does this sub-1kg laptop is simply a bargain. "I've been using it for six weeks now," said editor-in-chief Tim Danton, "and I'm consistently impressed by its power and the quality and sharpness of the AMOLED panel with its ridiculous 3,120 x 2,080 pixels." Runners-up place goes to the Lenovo Yoga Slim 7x, a similarly priced ultra-slim laptop that's based on a Snapdragon X Elite chip. Gaming aside, it's a blistering performer and its battery life is simply astonishing.



DESKTOP PC OF THE YEAR

WINNER CYBERPOWERPC ULTRA 3D5090
HIGHLY COMMENDED SCAN 3XS EDGE ICUE

"I've seen a number of glamorous PC designs this year," said editor-in-chief Tim Danton, "but when it comes down to it most people's priority is all-round speed, cutting-edge components and build quality. That's exactly what CyberPowerPC delivers with the Ultra 3D5090, which cost £4,000 but will deliver the goods for years to come." Want to save a little cash while still enjoying 4K games in all their glory? Then consider our runner-up, the £2,800 Scan 3XS Edge iCue, with its Ryzen 7 9800X3D and RTX 5080 combo earning a five-star review.

BUSINESS SOFTWARE OF THE YEAR

WINNER 3CX PHONE SYSTEM • **HIGHLY COMMENDED** ARCTERA BACKUP EXEC 25

We turned to Dave Mitchell, who reviews almost 100 business-related products each year, for his pick here. "I was bowled over by the rich set of call-handling features," he said of 3CX Phone System. "The change to per-system annual licensing makes it cost-effective, and 3CX even offers a free cloud-hosted SMB version for up to ten users." If you're looking for a "sophisticated data protection system for physical and virtual environments", then Dave points you to Arctera's Backup Exec 25. "It delivers excellent backup and recovery services, strong ransomware protection and its affordable Simple Core Pack licensing even includes integrated Microsoft 365 backup."

SECURITY SOFTWARE OF THE YEAR

WINNER WITHSECURE ELEMENTS ENDPOINT SECURITY PREMIUM
HIGHLY COMMENDED TENABLE NESSUS

What made WithSecure stand out? "It delivers tough ransomware protection and I particularly like its ease of use, Luminen AI-powered assistant and automated threat detection and remediation features," Dave Mitchell told us. And Jon Honeyball put his money where his nomination is. "Tenable Nessus is now a critical item in our security workflow. If a product can't get a clean bill of health, then serious questions need to be asked of the manufacturer's competence and internal testing processes."

YOUR BUSINESS IS BRIGHTER IN COLOUR

brother at your side

Whether creating reports that people actually want to read or bringing presentations to life, colour laser printers make a statement that mono can't match

There's a reason monotonous has "mono" in it. When you want to bring a print to life, you need colour. It's what adds zest to presentations, directs the eye in reports and can be the difference between everyday prints being left unread to something that stops the reader in their tracks.

If printing's past was fast mono laser printers as workhorses with inkjets reserved for special, limited run jobs, the future is obvious: fast colour laser printers. Choose Brother and you're choosing a safe pair of hands, as reflected by an unparalleled 12 *PC Pro* Technology Excellence awards in 12 years. What's more, Brother has upped its warranty to three years on the whole colour laser range.

This begs the question, why choose anyone else for glorious colour printing? But if you need any more reasons, consider exactly why Brother keeps on winning *PC Pro* Technology Excellence awards. First comes exceptional reliability, better than anyone else in the market. It also earns the double whammy for print quality and running costs – with the result that a staggering 98% of Brother printer buyers would buy another.

What's more, Brother takes responsible printing seriously. 100% of the genuine cartridges returned by customers are remanufactured or recycled – with zero waste going to landfill.

Still need us to twist your arm? Well, for a limited time Brother is offering up to £100 cashback on selected colour models.

TAKE CONTROL OF YOUR COSTS

MPS ESSENTIAL

Brother MPS Essential is designed to simplify the way you use your colour laser printer (no matter how much or little you print). You get automatic supplies delivered when you actually need them, hassle-free setup and remote support, with the freedom to cancel at any time.

MPS PROFESSIONAL AND ENTERPRISE

Brother MPS Professional and MPS Enterprise are all about making the way you print in colour feel personal. With custom installation, support and flexible payment options, as well as the option to tailor your service across multiple sites and printers, they make printing work for your business – and only your business.

12x PC PRO AWARD WINNER
PC PRO TECHNOLOGY EXCELLENCE AWARDS 2024
PC PRO TECHNOLOGY EXCELLENCE AWARDS 2023
PC PRO TECHNOLOGY EXCELLENCE AWARDS 2025 WINNER
PC PRO TECHNOLOGY EXCELLENCE AWARDS 2022
PC PRO TECHNOLOGY EXCELLENCE AWARDS 2019
PC PRO TECHNOLOGY EXCELLENCE AWARDS 2020
PC PRO TECHNOLOGY EXCELLENCE AWARDS 2021

*Cashback and warranty promotions apply to all Brother colour laser printers. Terms and conditions apply. For full details, visit www.brother.co.uk/brother-products/view-offers

WORKSTATION OF THE YEAR

WINNER SCAN 3XS GWP-A1-TR64 ● **HIGHLY COMMENDED** ARMARI MAGNETAR MC64T9

Is it odd that we find this workstation a thing of beauty merely to gaze at? However, that's not the reason our workstation expert James Morris picked it out as the winner. "The 64-core AMD Ryzen Threadripper 9980X CPU blasts through any processor-intensive workload, while the Nvidia RTX Pro 6000 Blackwell graphics deliver silky smooth 3D viewports and rapid GPU-accelerated activities," he said. Armari paired the "latest AMD Ryzen Threadripper 9970X CPU with the RTX Pro 6000," James added. "The combination achieved the best everyday media performance I've ever seen, and was near the top in almost every other test as well."

SECURITY HARDWARE OF THE YEAR

WINNER ZYXEL USG FLEX 50HP
HIGHLY COMMENDED DRAYTEK VIGOR C510AX

You need something special to stand out in this competitive sector, and for Dave Mitchell it was Zyxel's Smart Sync feature. "This means never having to choose between local or cloud management again as configuration changes made in one automatically sync to the other. Add in Zyxel's Gold Security Pack and you have one of the most versatile security appliances on the market," he said. And the DrayTek Vigor C510ax? "DrayTek's routers have garnered a fine reputation among businesses that won't tolerate internet downtime and the Vigor C510ax takes this to the next level. It's bursting with WAN redundancy features, the new DrayOS 5 software adds valuable security measures and DrayTek delivers it all at a pleasing price."

PHONE OF THE YEAR

WINNER SAMSUNG GALAXY S25 ULTRA
HIGHLY COMMENDED APPLE iPHONE 17

The Galaxy S25 Ultra has sat atop our A List since March, and we turn to Mark Spoonauer's original review to see why. "With... its existing AI smarts, superb display, top-notch cameras, super-smooth performance and long battery life, the Galaxy S25 Ultra is a tremendously impressive proposition – so much so that I'm tempted to switch to Android myself." How fortunate for Apple that the iPhone 17, our runner-up this year, has kept him loyal.

BUSINESS LAPTOP OF THE YEAR

WINNER DELL PRO 13 PREMIUM ● **HIGHLY COMMENDED** LENOVO THINKPAD X1 CARBON GEN 13

Remember when business laptops were boring? Not any more. Both of these laptops deserve to turn heads thanks to their sleek contours, all-metal finishes and top-quality panels. "The Dell Pro 13 Premium reeks of professionalism from every dark grey pore, while the recycled magnesium finish could not look any classier," wrote Tim Danton in his review. "If you want a laptop to whip out of a bag and make a great first impression, this is it." Then we come to the 13th generation of Lenovo's ThinkPad X1 Carbon, now weighing a mere 1kg. But the biggest change over time is how much battery life you can expect, with our sample – which included an IPS panel rather than the AMOLED option – lasting for almost 19 hours of light usage. Neither laptop is cheap, but you can't argue with their quality.

BUSINESS HARDWARE OF THE YEAR

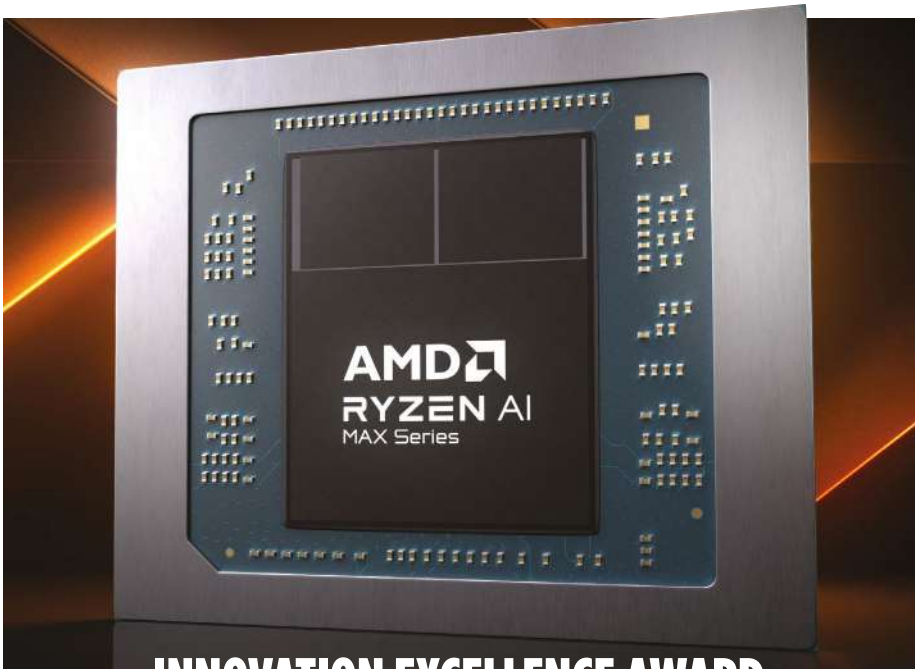
WINNER RUIJIE REYEE RG-RAP73PRO
HIGHLY COMMENDED UBIQUITI U7 PRO MAX

Safe to say Dave Mitchell was taken by Ruijie's debut in *PC Pro*: "The combination of a big BE14000 rating, 2.5GbE multi-gigabit and 10GbE SFP+ fibre ports delivered outstanding performance in my lab tests, and I was hugely impressed by Ruijie's free cloud management service," he said. "A price a shade over £200 makes it an absolute steal." Jon Honeyball was equally effusive about his pick: "The U7 Pro Max is a great example of a new generation of Wi-Fi access points that show the speed potential of modern Wi-Fi. And it does so with a management interface that's second to none."

BUSINESS INNOVATION AWARD

WINNER OWL LABS MEDIUM ROOM SOLUTION • **HIGHLY COMMENDED** PROGRESS SHAREFILE PREMIUM

"Owl Labs consistently sets new standards for immersive videoconferencing and the Medium Room Solution makes sure no participant is left out," said Dave Mitchell of his top pick. "The Owl Bar provides a front-of-room view, and placing the Meeting Owl 4+ in the centre of the table brings its smart 360° panoramic and dynamic split screens into play. They meld together seamlessly over Bluetooth to make mundane meetings unforgettable." Progress ShareFile Premium takes the Highly Commended award as it "goes way beyond traditional cloud file sharing, syncing and collaboration," said Dave. It also offers "smart automated threat remediation that uses machine learning to detect and block suspicious user activity".



INNOVATION EXCELLENCE AWARD

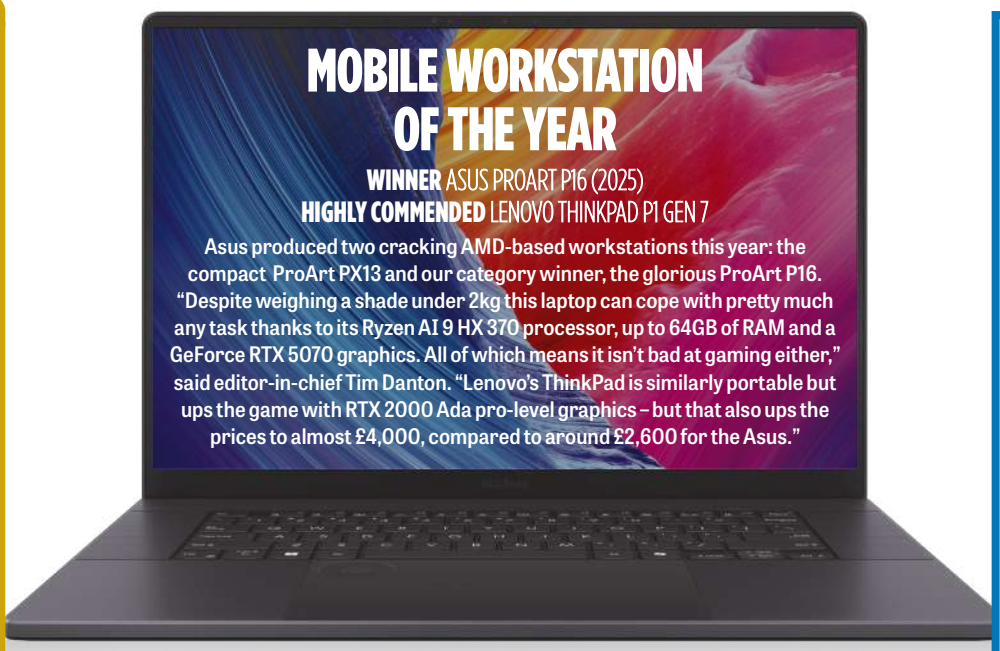
WINNER AMD STRIX HALO • **HIGHLY COMMENDED** APPLE AIRPODS PRO 3

It says something about AMD's stunning Strix Halo – or the Ryzen AI Max+ 395 to give it its official name – that Intel still hasn't conjured up a chip to rival it, despite AMD unveiling the Strix Halo all the way back in January at CES. If anything it's only grown in power, now able to run AI models with over 100 billion parameters when paired with 128GB of memory. And while the jury is out on Live Translation, which we expect to improve over time, Apple's AirPods Pro 3 provide unparalleled levels of noise cancellation and excellent audio quality at a competitive price.

CHROMEBOOK OF THE YEAR

WINNER LENOVO CHROMEBOOK PLUS GEN 10

A product so impressive it made our reviewer renounce his negative views: " My days of dunking on Chromebooks are over," wrote Jason England. "The Lenovo Chromebook Plus Gen 10 isn't merely the best Chromebook I've used this year, but also one of the best laptops full stop." Aside from its all-round quality (note the 14in AMOLED panel), this machine also gave a debut to the MediaTek Kompanio Ultra 910 chip, which includes a 50 TOPS NPU to accompany the AI talents of Google's cloud-based Gemini chatbot. All in, this is an incredibly forward-looking laptop despite costing £549.



MOBILE WORKSTATION OF THE YEAR

WINNER ASUS PROART P16 (2025)
HIGHLY COMMENDED LENOVO THINKPAD P1 GEN 7

Asus produced two cracking AMD-based workstations this year: the compact ProArt PX13 and our category winner, the glorious ProArt P16. "Despite weighing a shade under 2kg this laptop can cope with pretty much any task thanks to its Ryzen AI 9 HX 370 processor, up to 64GB of RAM and a GeForce RTX 5070 graphics. All of which means it isn't bad at gaming either," said editor-in-chief Tim Danton. "Lenovo's ThinkPad is similarly portable but ups the game with RTX 2000 Ada pro-level graphics – but that also ups the prices to almost £4,000, compared to around £2,600 for the Asus."

MINI PC OF THE YEAR

WINNER WIRED2FIRE AMD R8845 MINI PC
HIGHLY COMMENDED HP Z2 MINI G1A

This year has given us many riches when it comes to mini PCs, with the category rapidly moving from niche to mainstream – ironic as the design does love a niche. We recently put the latest mini PCs through their paces in a Labs, and it was the Wired2Fire AMD R8845 Mini PC that took the main award. "If you can cope with a little noise, the Wired2Fire AMD R8845 Mini PC will feel like a revelation," said reviewer Simon Handby. "Here's a sub-one-litre PC for £600 that can live with – and in some cases beat – range-topping models from the major brands." Then we come to the phenomenal HP Z2 Mini G1a, which our editor-in-chief fell in love with thanks to the outstanding abilities of the AMD Ryzen Strix Halo chip that won our Innovation Excellence award.

SUSTAINABILITY EXCELLENCE AWARD

WINNER FAIRPHONE
HIGHLY COMMENDED ACER

"This award isn't for its 6th gen phone, featuring a 50MP camera, 120Hz OLED display and 17Wh battery" said Lee Grant, "it's to recognise that Fairphone remains the only OEM to ensure these features are user-repairable to benefit their customers, maximise product lifespan and reduce e-waste. We haven't time to talk about its 48% reduction in CO2 emissions, $1m living wage payout or active reduction of toxic chemical exposure in electronic supply chains." And why Acer? "Its CEO, Jason Chen, makes honest comments on the environmental cost of doing business. The range of products eligible for environmental certifications (like EPEAT) is also increasing."

BUSINESS CHROMEBOOK OF THE YEAR

WINNER ACER CHROMEBOOK ENTERPRISE PLUS SPIN 514

"When I went to IFA in September, I wasn't expecting to be wowed by any Chromebooks," said editor-in-chief Tim Danton, "never mind ones designed for business use. So imagine my surprise when I was drawn to this sleek little device sitting on one of the central desks." The sleek device in question is a 1.4kg convertible with a 14in IPS panel in a choice of 1,920 x 1,200 or 2,880 x 1,800 resolutions, and like the Lenovo Chromebook on p37 it features the NPU-toting MediaTek Kompanio Ultra 910 processor. But what lifts this into business territory is the Chrome Enterprise Upgrade, which makes it far simpler to manage big rollouts while boosting security measures. "But it's not the specs that really grabbed me but the stylish nature of the build, which I'm simply not used to seeing from Chromebooks," said Tim.

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COULD THIS £100 PI RUN YOUR OFFICE?

Barry Collins spends a week working on a Raspberry Pi... and rather likes it

The problem with being *PC Pro*'s features editor is you sometimes have to follow through on your own stupid ideas. So when, during a features meeting a few months ago, I idly speculated whether you could actually work full-time from a Raspberry Pi, editor Tim immediately gave it the thumbs up and slotted it into the schedule.

Consequently, I've just spent a week doing as much work as possible from a computer that cost less than the backup SSD connected to my Mac. You'll notice that "as much work as possible" caveat, because there are some jobs in my day-to-day existence – shuffling round magazine pages in InDesign and editing podcasts in Audition to name but two – that the Pi simply can't cope with. Not only in terms of raw power but also lack of access to the necessary software.

However, these are not everyday office tasks. Many workers these days spend 90% of their time in a web browser, or dealing with email, on video calls, or collaborating with colleagues in apps such as Teams or Slack. So could a Raspberry Pi that's perfectly capable of accessing all these services really be a passable office system? There was only way to find out.

The all-in-one approach

The Pi I selected for this daft little experiment was the Raspberry Pi 500 – basically a Raspberry Pi 5 wrapped in a keyboard enclosure, similar to the Commodore 64 of yore, albeit considerably slimmer. And without the power brick that gave bricks a bad name.

That's not to say the Raspberry Pi 500's own power supply is without its problems. The Raspberry Pi 500 doesn't come with a power supply, so I ordered the official 27W offering along with a micro-HDMI cable (a man can never have enough HDMI cables) from the Pi Hut, bringing the total cost of the hardware to £107.50 inc VAT.

However, that power supply comes with a stingy 1.2m cable, which barely stretches from the power bank underneath my desk to the Pi sat on the desk itself. Indeed, for the first few minutes, I thought the Pi Hut had sent me a duff unit, because the power cable was so stretched I'd managed to half pull the plug out of its socket. My suspicion is that for most office desk setups that power cable isn't long enough. You may wish to explore alternatives. You can't even replace the cable with a longer USB-C cable you may have to hand, because it's captive.

RIGHT The Raspberry Pi 500 is a Raspberry Pi 5 in a keyboard enclosure

Once the power problems had been sorted, the setup could barely be simpler. The Pi 500 comes with a 32GB SD card pre-loaded with Raspberry Pi OS, so as soon as you've (properly) plugged it in and pressed the power button, it boots straight into the OS. Choose a password and you're away.

Raspberry Pi OS is a pretty barebones OS. It bundles almost nothing but a browser, it looks dated and its recommended software store isn't exactly overflowing: LibreOffice, Chromium, the usual suspects. Not that you'd need anything particularly fancy for a run-of-the-mill office machine that's going to be doing a fair bit of legwork

in the browser, but it wasn't making my heart sing either. Was there a better alternative out there?

I've become a Linux Mint fanboy since installing it on a pensionable iMac in our kitchen. Given Mint's system requirements are so gentle that it could run on an overclocked Casio calculator, I thought it would be the ideal candidate for the Pi, but Mint doesn't officially support Arm processors.

I've always had a soft spot for Ubuntu – you may dimly recall a *PC Pro* feature from more than a decade ago when we tried to run the office on it for a week (spoiler: it didn't end well) – and there's an official distribution of that for the Pi 500, too. Pottering around various online forums, most people seemed to recommend running Ubuntu from an SSD rather than an SD card to improve performance, so I used the Raspberry Pi imager to flash Ubuntu onto an old Samsung T7 SSD I had lying around.

I popped out the microSD card containing Raspberry Pi OS so the poor lamb didn't get confused, changed the Pi's boot order to shoot from the SSD first and... nothing happened. Time out after time out, as the Pi 500 hunted in vain for a USB device to boot from. An hour of troubleshooting later, it appears that the T7 is just one of those external SSDs that the Pi simply doesn't rub along with. Apparently, forum folk tell me, the Pi is fussy about which SSDs it talks to, and my T7 was about as welcome as a trombonist in a string quartet.

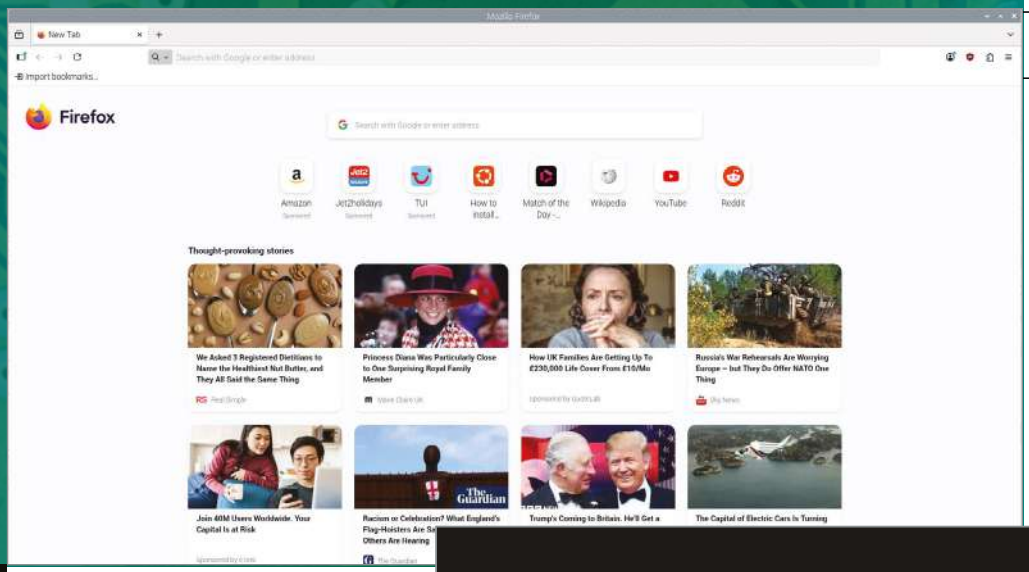
The Pi is fussy about which SSDs it talks to, and mine was as welcome as a trombonist in a string quartet

TOP The Ubuntu App Center is a well-stocked resource

ABOVE The Pi 500 is plenty powerful enough for your everyday tasks

New OS on the cards

Determined to get Ubuntu on to the PI one way or another, I nipped over to Tesco and bought a new microSD card, so that I could flash Ubuntu onto the fresh card without overwriting the Raspberry Pi OS, just in case something went wrong. For the accountants in the house,



that sent my overall hardware bill soaring to £117.40.

This worked a treat, putting me in the much more familiar and comfortable environs of Ubuntu. The Ubuntu App Center contains my favourite browser, Vivaldi, so after the inevitable half hour of operating system updates, the browser was installed. Except when I entered my Vivaldi encryption password to synchronise all my bookmarks, history and other browser settings from my Mac installation of the browser, it immediately crashed. And did so again and again on the next couple of attempts. I realise a failure to sync my niche browser of choice is hardly a fatal hole for most people, but it registered as a definite pain in the neck for me. Back to Firefox we go.

However, that's a mere minor irritation compared to the next problem off the rank: my Raspberry Pi 500's spacebar was oddly erratic. I first noticed it when I was setting up the PC, but when I started typing into a LibreOffice document it became all the more apparent. Sometimes a space wasn't registered at all and my words huddled together like nuns on the back of a bus; sometimes it was whacking an extra space in between words. I plugged my regular external keyboard (a Keychron C3 Pro, since you asked) into the back of the Pi and the problem was immediately resolved. But now I've got two keyboards on my desk, of course, which is hardly ideal.

I'm not the only one griping about the Pi 500's spacebar, either. A quick Google search reveals other owners have trouble with missing spaces, an issue reportedly acknowledged by staff in the Raspberry Pi Store in Cambridge, who advised one owner to press the spacebar plum in the middle because there's only one centrally placed switch beneath the key.

Getting the office ready

Now the hardware was largely working, it was time to start sorting out the software for my regular office duties. LibreOffice is pre-installed in Ubuntu and it's absolutely fine for 99% of what I need it to do. Professional Excel wranglers might still need the mothership – and, of course, there are browser-based versions of Excel available these days, albeit not with the full spectrum of features –but most office workers could easily get by with the tools in LibreOffice.

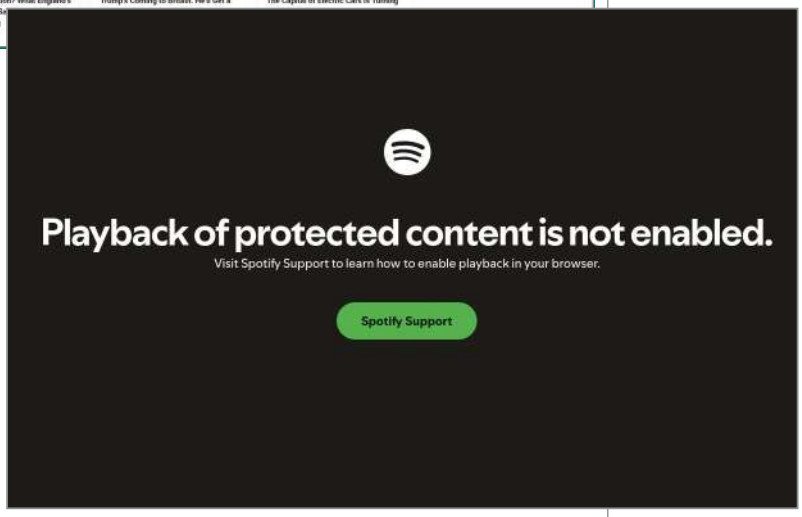
I hadn't used LibreOffice in quite a while, so I was pleasantly surprised to find that part of the setup routine now lets you choose from a variety of interfaces, one of which is a tribute act to the Ribbon interface found in Microsoft's Office apps. That made the transition even easier.

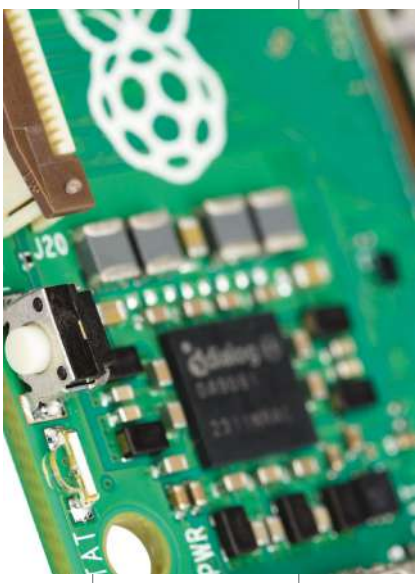
The *PC Pro* communications app of choice is Slack, and I was heartily relieved to find there's a Linux version of that in the Snap store (an app manager that works across various Linux distros). That relief lasted about as long as Keir Starmer's honeymoon period, however, when it became clear that the version of Slack in the store is designed for AMD64 processors, not Arm-based systems. In Slack's case it's not a total showstopper, as there's a web-based version of the software to fall back on. However, that's not always the case for other apps, so do your homework first if you're planning to switch to any Arm-based Linux distro.

Talking of Slack, one of the common ways in which editor Tim and I discuss what's going in the mag is via a Slack Huddle (poncey term for an ad hoc video call), but one of the drawbacks of relying on Slack's web client is that Huddles are disabled. Nevertheless, Tim and I chatted away perfectly happily using Google Meet, with the Pi comfortably handling the video call gabbling away in one browser tab while I consulted Google Sheets containing the *PC Pro* masterplan in another. The Pi happily accepted my Logitech USB webcam, the only drawback being that without Logitech's driver software, I was unable to correct the camera's tendency to underexpose subjects against a bright background, meaning my chat with Tim carried the unwelcome air of a hostage video.

Email-wise, Thunderbird comes pre-installed with Ubuntu and is... fine. I've never massively warmed to Thunderbird, always feeling it lagged about five years behind the curve. For example, there's no easy way to create a unified inbox, where all new messages from your various email accounts appear. There's an eight-step guide to creating one on Mozilla's help pages, but in most mail clients these days it's a simple option you switch on. Nevertheless, Thunderbird will do for most people, especially if you're only using the single inbox. And many people will be using webmail services such as Gmail anyway, where the facilities on offer in the web version probably outstrip anything a desktop client will offer.

The one other office essential is, of course, Spotify. If I'm proofing *PC Pro* pages, I need swooning classical symphonies or *Bucks Fizz's*


Playback of protected content is not enabled.
Visit Spotify Support to learn how to enable playback in your browser.
Spotify Support



TOP The Raspberry Pi OS is pretty basic, but it does include a web browser

MIDDLE Getting Spotify to play on the Pi proved an unconquerable challenge

ABOVE As the Pi 5 is an Arm-based system, you'll need to check if a vital app will work on it

A FRESH SLICE OF PI

Just as we put the finishing touches to this feature, the sods announced a successor to the Raspberry Pi 500 that I've used here. The good news? It (theoretically, at least) deals with two of the biggest problems I experienced when using the Pi 500 as my office driver.

The first improvement is the keyboard. The new Raspberry Pi 500+ has a mechanical keyboard, which should deal with the erratic spacebar and other issues I had with the chiclet design on the 500. Each of the keys on the 500+ "rests on a Gateron KS-33 Blue switch with a custom RAL 7001 Silver Grey stem, giving a satisfying sound and feel when pressed", according to the company, and each of those keycaps is replaceable if you don't like how they look or feel. It even has individually addressable RGB lighting!

The other huge improvement is the addition of a built-in 256GB SSD. This should make a big difference to performance, helping websites to load more snappily and eradicate those little brain farts that made working on the Pi 500+ occasionally frustrating. It's easily upgradable, too, with the M.2 slot accessible with a provided tool.

The downside is the cost. The new Raspberry Pi 500+ costs £172.80 inc VAT, which is more than double the price of the 500. Nevertheless, in the grand scale of things, it still remains remarkably cheap for what should be a very competent office desktop. I can't wait to get my hands on one.

ABOVE The new Raspberry Pi 500+ has an improved mechanical keyboard

Greatest Hits to focus the mind. Alas, getting Spotify to play on the Pi proved an unconquerable challenge. There was no app in the Ubuntu store (another victim of the AMD64/Arm thing) so I resorted to the web player, but hit a brick wall here, too. "Playback of protected content is not enabled," read the huge message splashed across the screen, with links to Spotify's support pages offering guides on how to unlock the DRM facility in various browsers. Alas, the instructions for Firefox proved incorrect – again, I suspect because Spotify is expecting you to run the AMD64 version of Ubuntu. Even a third-party app that promised access, called spotify-qt, seemed to be snagged by a recent change to Spotify's developer settings, which no longer allows localhost to be used as the web Uniform Resource Identifier to access the service.

AI on the Pi

Of course, we can't write anything in *PC Pro* these days without dropping a few coins into the AI fountain.

The Raspberry Pi 500's graphical prowess is impressive for a sub-£100 device. It had no problem running smoothly on my 34in 3,440 x 1,440 widescreen monitor, and it's perfectly capable of streaming 4K footage without stutter. It's not, however, an AI powerhouse. Nobody in their right mind is running Stable Diffusion or any local LLMs on this thing.

However, that's not the way the vast majority of people interact with AI anyway. Most rely on cloud services such as ChatGPT or Google Gemini, which are easily accessible through the browser. And because they're cloud services, they're no slower on the reasonably limited Pi than they are on a £3,000 ThinkPad. The only thing the Pi can't do is run the ChatGPT app locally, so features such as getting it to watch over what you're bashing into VSCode are out. Again, however, not typical office duties.

The Raspberry Pi 500's graphical prowess is impressive for a sub-£100 device

The AI services also come in handy for dealing with some of the unfamiliarities of running on Pi hardware. When I was trying to find out how to change the boot order from SD card to SSD, for example, it was Google Gemini that supplied the necessary code snippets for the terminal. If you did decide to roll out Pi hardware, the AI services could be a great help in navigating around alien operating systems.

The pi-fect office PC?

Can you use a Raspberry Pi 500 as an everyday office PC? Yes, you probably can, with a sizeable asterisk on that statement. I spent a week working on and off with it, mainly for word processing, but for plenty of other little jobs as well, and it held up.

It's always hard comparing something like the Pi to the MacBook Pro that's my daily driver, because of course the experience is going to be worse. Websites don't open in a snap, things get a bit sticky if you've got more than three or four apps open, it sometimes pauses to think. Perhaps the most annoying part of working with the Pi was the micro-brain farts that regularly occurred, sometimes resulting in a dropped keystroke. They weren't a showstopper, but having to go back to correct words occasionally was an unwanted pain. It could be that installing the OS on a compatible SSD rather than a SD card would solve that, but then you're bumping up the price, too.

And while we're talking of skipped letters, I'm not convinced the Pi 500 and its iffy spacebar is the ideal Pi hardware for the job. Far better to go with a Pi 5, a decent enclosure and your own keyboard – or the Pi 500+ (*see above left*). Don't forget to budget for a longer power cord if your plugs aren't close, too. Or, more practically, power the Pi from a monitor.

If you've got an office role where users spend the vast chunk of their day in the web browser, dealing with email and shuffling documents around, a little slice of Pi could well be a strong option. Even in the home, it could certainly serve a purpose as a homework terminal for the kids, with the added advantage of it not being easy for the little brats to install *Minecraft* or other distractions on it.

All told, you do get an awful lot of computer for £100 these days.

WHAT'S NEW IN MICROSOFT WORD

The world's best-known word processor just keeps on gaining new capabilities. Nik Rawlinson checks out the latest features you might have missed

Most of us don't ask much from a word processor. It's been suggested that the original release of Word for Windows back in 1989 did everything most people need, so you might well wonder how Microsoft can possibly keep evolving the app in ways that are useful enough to justify a rolling subscription.

Yet recent releases have brought some significant updates – and if you haven't noticed them, that's because Microsoft has taken the respectable approach of keeping most of them out of your way, unless you specifically call on them.

As you surely know, Word is part of Microsoft 365, available as a monthly or annual subscription. Pricing for home users starts at £85 per year for a single user, £105 for a family of up to six. That's a price rise compared to last year, but it now includes AI-powered Copilot features. If you want the suite without Copilot, you can downgrade your subscription – and claim a partial rebate – via the instructions at **tinyurl.com/375downgrade**.

Just released last month, there's also a new option called Microsoft 365 Premium. For £19 a month, or £190 a year, this gets you the full set of AI features, with the highest usage limits. That includes Copilot Chat, which is based on ChatGPT – so if you're currently paying a separate £20 a month rate for ChatGPT Plus, Microsoft 365 Premium could be a much more cost-effective option, especially since one subscription covers up to six users.

For businesses, Copilot is an add-on to existing Microsoft 365 or Office 365 plans, costing around £24 per user per month on top of the standard licence.

If you'd like to try before you buy, there's a free one-month trial (see **tinyurl.com/375trial**). Be warned, however, that this is available only for the Family bundle, so if you're interested in a Personal licence, be sure to cancel the auto-renewal before the trial period expires.

The other way to get the productivity suite without Copilot is to buy an Office 2024 licence for a one-off cost of £120. However, as well as lacking the integrated AI tools, this doesn't come with Outlook or the Clipchamp video editor, it won't get any new feature updates, and it also doesn't include the 1TB of OneDrive storage that's bundled in as a perk for 365 subscribers.

COPILOT AI

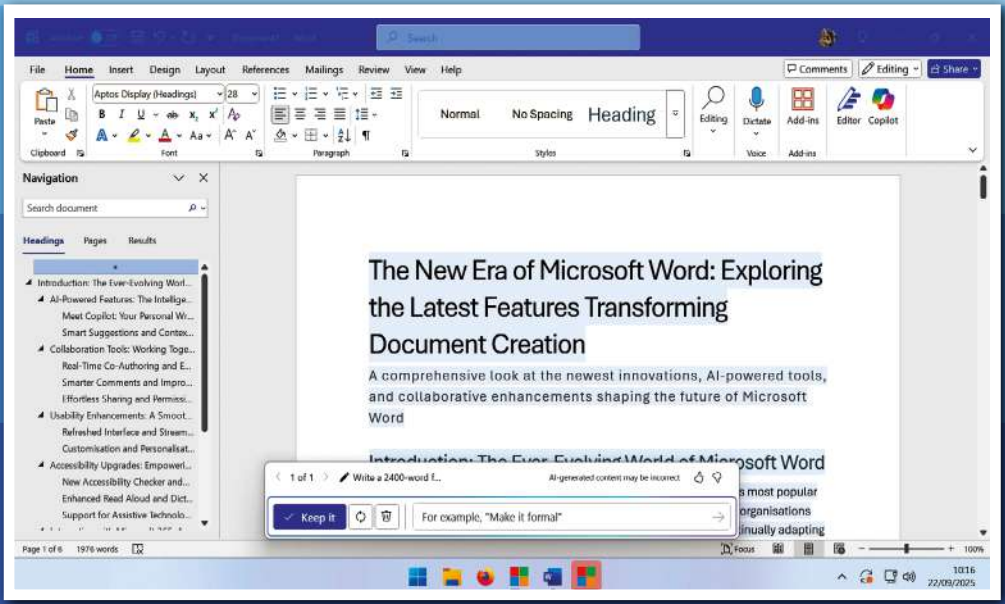
Without a doubt, Copilot is the biggest feature added to Word in recent years. The AI assistant is based on ChatGPT, so it benefits from the ongoing development of that platform. This includes the recent GPT-5 engine, but Word automatically selects between different AI engines to provide speedy responses for simple, straightforward requests, and deeper reasoning for more complex, open-ended questions. To test-drive it for yourself, look for the "Try GPT-5" button at the top right of the Copilot Chat window.

One of Copilot's most impressive abilities is generating complete documents out of thin air. We asked it to draft a 2,400-word document outlining the latest additions to Microsoft Word (not the one you're reading now, to be clear), and in less than a minute it had produced a well-structured essay, with headings for easy navigation.

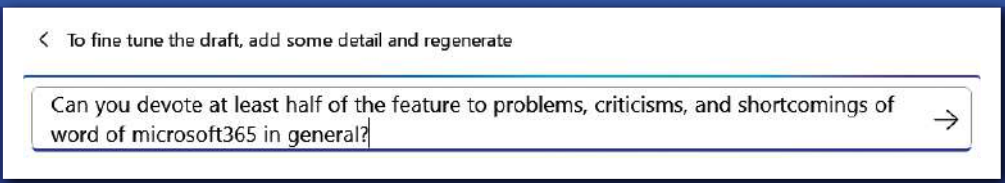
Tha AI is also great at refining text. We asked it to rewrite the feature, this time devoting at least half of the word count to criticisms of Word, and of Microsoft 365 in general. This time the finished product came out a little short, but it would make a superb starting point for a purchasing brief.

Even though you're paying for the subscription, this type of AI usage

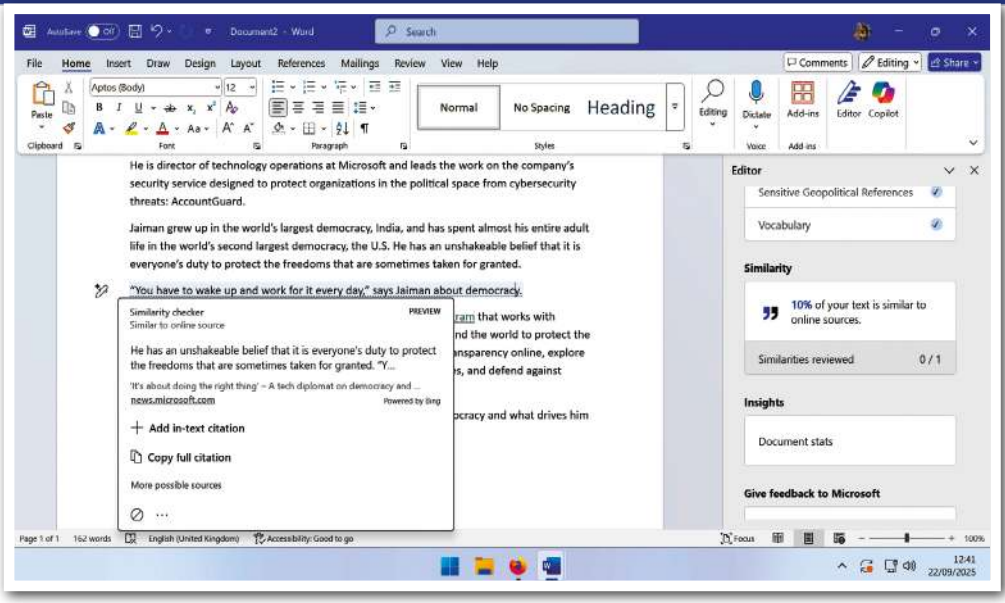
WITHOUT A DOUBT, COPILOT IS THE BIGGEST FEATURE TO BE ADDED TO WORD IN RECENT YEARS


The New Era of Microsoft Word: Exploring the Latest Features Transforming Document Creation
A comprehensive look at the newest innovations, AI-powered tools, and collaborative enhancements shaping the future of Microsoft Word
Keep it
For example, "Make it formal"

LEFT Copilot wrote a long, detailed report for us in less than a minute


To fine tune the draft, add some detail and regenerate
Can you devote at least half of the feature to problems, criticisms, and shortcomings of word of microsoft365 in general?

LEFT Copilot prompts can use previous results as a starting point for further work



ABOVE Microsoft Editor's similarity checker can check for plagiarism and add citations

isn't unlimited. Standard home and family users get 60 AI credits per month, renewing on the first of each month. These "credits" are nebulously defined, with complex tasks using more credits than simple ones; after creating our second draft, we checked our balance and saw that we had 56 AI credits remaining. This represents two major AI actions – the original draft, and the rewrite. Credits are shared across AI-enabled applications, including Word, Excel, PowerPoint and Outlook.

If you don't want to use Copilot, you can turn it off. Click File followed by Options, then click Copilot in the sidebar. Untick the box beside Enable Copilot.

MICROSOFT EDITOR

You can access Microsoft Editor for free in your browser (see **tinyurl.com/375editor**), but it also appears directly in the Word sidebar, where it rates your document for clarity, checks the spelling and grammar, and gives an overall Editor Score. The closer you get to 100, the better. If you're using Microsoft 365 you've probably come across this feature already – although you might not always agree with its suggestions, particularly if you have a house style you need to follow.

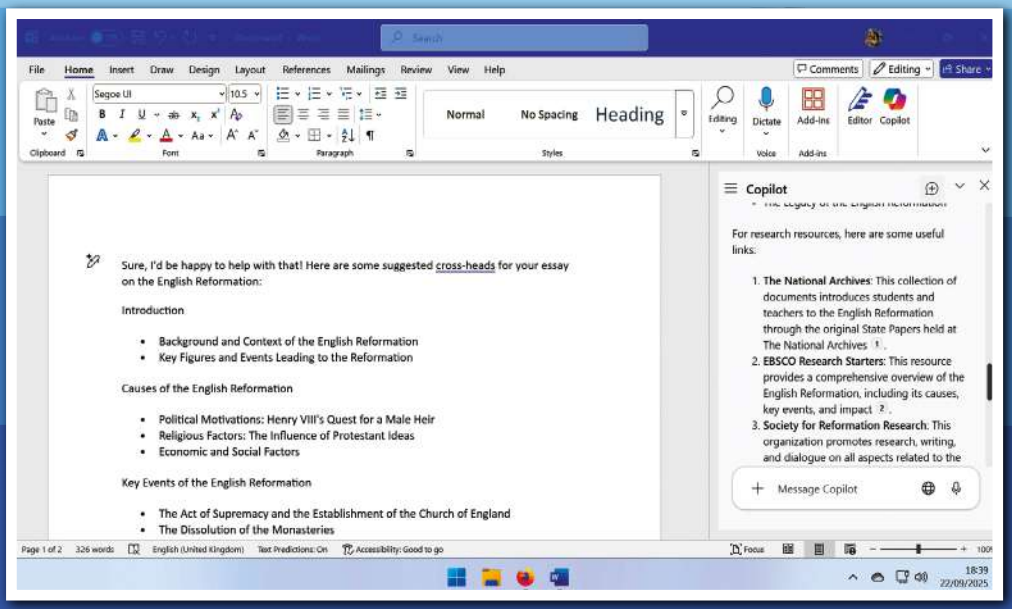
One other very valuable feature of Editor is the similarity checker. This compares the content of your file to online sources in an attempt to detect plagiarism, or to help you find original sources and give them due credit.

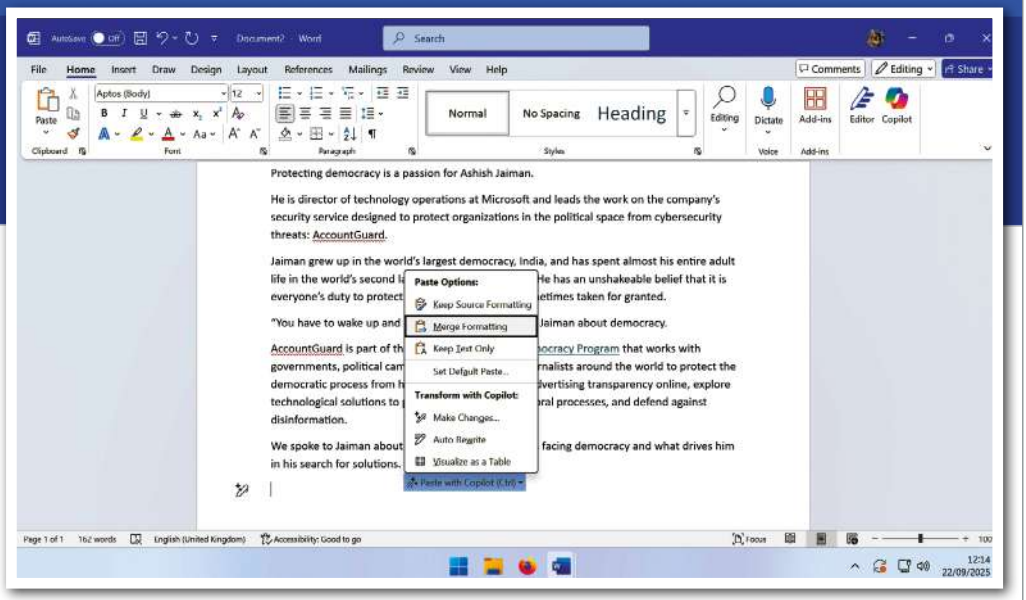
We tested this by pasting the opening paragraphs of some Microsoft press releases into our documents, and watched as it promptly identified the source of content originally published four years ago. More impressively, it repeated the trick even when we replaced the content with text that was just over two weeks old. The AI gave us the option of adding an in-text citation, which turned the text into a hyperlink to the original document, or copying the full citation to the clipboard, from which we could insert it into a footnote, endnote or bibliography, or include it within the flowing text.

There's one further useful editing feature, just added last month, though for now it works only in the Word web app, and only for documents written in English. Select a section of your text – or your entire document – and click the pen icon in the left margin, then select "Fix spelling and grammar". Word immediately suggests edits; you can choose to "Keep all" of them, or "Undo all" to return the text to its previous state. To roll back individual corrections, hover over the applicable phrase or word you want to recover and click Undo.

RESEARCH ASSISTANT

As well as powering Microsoft Editor, the Copilot sidebar can act as a writing companion, suggesting


Copilot
Sure, I'd be happy to help with that! Here are some suggested cross-heads for your essay on the English Reformation:
Introduction
Background and Context of the English Reformation
Key Figures and Events Leading to the Reformation
Causes of the English Reformation
Political Motivations: Henry VIII's Quest for a Male Heir
Religious Factors: The Influence of Protestant Ideas
Economic and Social Factors
Key Events of the English Reformation
The Act of Supremacy and the Establishment of the Church of England
The Dissolution of the Monasteries
For research resources, here are some useful links:
1. The National Archives: This collection of documents introduces students and teachers to the English Reformation through the original State Papers held at The National Archives
2. EBSCO Research Starters: This resource provides a comprehensive overview of the English Reformation, including its causes, key events, and impact
3. Society for Reformation Research: This organization promotes research, writing, and dialogue on all aspects related to the
Message Copilot


Protecting democracy is a passion for Ashish Jaiman.
He is director of technology operations at Microsoft and leads the work on the company's security service designed to protect organizations in the political space from cybersecurity threats: AccountGuard.
Jaiman grew up in the world's largest democracy, India, and has spent almost his entire adult life in the world's second l
He has an unshakeable belief that it is everyone's duty to protect
ettimes taken for granted.
"You have to wake up and
Jaiman about democracy.
AccountGuard is part of th
ocracy Program that works with governments, political cam
rnalists around the world to protect the democratic process from h
dvertising transparency online, explore technological solutions to
ral processes, and defend against disinformation.
We spoke to Jaiman about
facing democracy and what drives him in his search for solutions.
Paste Options:
Keep Source Formatting
Merge Formatting
Keep Text Only
Set Default Paste...
Transform with Copilot:
Make Changes...
Auto Rewrite
Visualize as a Table
Paste with Copilot (Ctrl)

content and even performing research on your behalf. We tried it out by asking it to populate a new document with cross-headings and provide research links for an essay on the English Reformation. Its suggestions were impressively comprehensive, covering Henry VIII's desire for a male heir, Anne Boleyn's role and the break with Rome. The links it provided took us to a variety of sources, including the National Archives, and we were pleased to find that clicking the reference number beside each one opened it in our default browser (Firefox), rather than trying to force us to use Edge.

It's also nice that generated content isn't immediately splurged into your document: you can refine it in the chat before hitting Insert to transfer it onto the page. There's one aspect of the process that isn't quite perfect, though – the inserted text it includes the preamble ("Sure, I can help you get started with..."), which perhaps explains how some published pieces occasionally give away their synthetic origins. Be sure to read through your document carefully when you've finished adding your own content.

SMARTER PASTING

For many decades, the paste function in Word inserted the contents of your clipboard into your document – along with as much of its formatting as it could carry over. We can only guess at how much irritation has been caused over the years by mismatched fonts and colours being dumped onto people's pages whenever they tried to include passages from other documents or from web pages.

At last, the default behaviour has been changed. With recent updates to Word, the default paste behaviour now matches the style and formatting of the surrounding text, so that content copied from elsewhere fits seamlessly in. If you want to keep the original formatting, press and hold Ctrl for a few seconds after pasting; when you release the key, a smart Paste Options menu appears. Merge Formatting is the default, but you can alternatively select Keep Source Formatting to copy the text with its original appearance. You can also change this back to the default, if you wish, by clicking "Set Default Paste..." on this menu.

TOP Copilot in the sidebar can be used to structure a document

ABOVE The default paste behaviour has recently changed to match the document style

You'll notice from the screenshot on the left that there are also some new Copilot paste options, which appear once the pasted text has been added to your document. Auto Rewrite will generate a few versions of the original text in different styles and tones for you to choose from; each is previewed in a floating window so you can click between them. If you're working on multiple drafts of a document this can be a big time-saver. Likewise, if you need to repurpose your own content for multiple channels, this could save you writing each one from scratch – or at least give you a number of starting points.

Another simple but welcome interface change is that you can now hold down the Ctrl key and hit the plus and minus keys to zoom in and out, finally making Word's behaviour consistent with other applications.

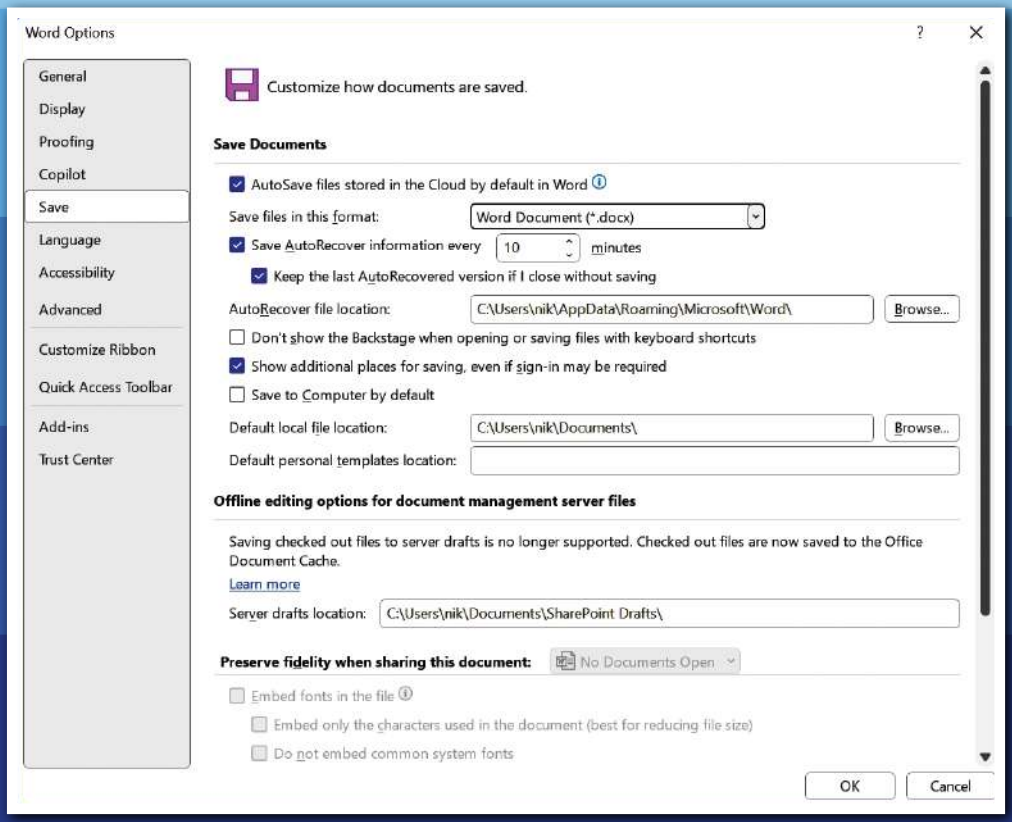
SAVING TO THE CLOUD

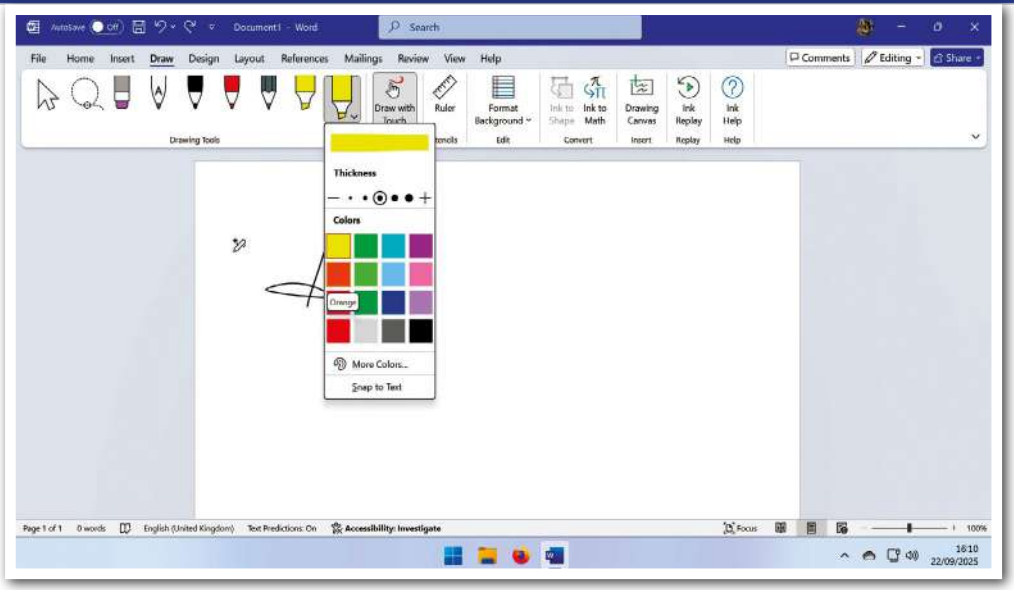
There's been some controversy over recent changes to the way Microsoft 365 apps save documents. Items now save to your OneDrive by default, and the default filenames are now supposed to be time- and date-based – although in our tests, Word seemed to still be using the older format of "Document" followed by a number.

Naturally you can still save files to your hard disk or to other locations, but you have to tell Word that's what you want to do. In the Save dialog box, either click the default online folder beneath "Choose a Location", or click the "More options..." link to open the full Save As screen.

There are advantages to sticking with OneDrive. As has been the case for some time, documents that reside in OneDrive will be continually saved as you continue working on them, Google Docs-style, so your latest amendments will always be visible to collaborators. If you

MICROSOFT 365 APPS ARE UPDATED SEVERAL TIMES A YEAR, SO EXPECT TO SEE NEW FEATURES PERIODICALLY


Word Options
General
Display
Proofing
Copilot
Save
Language
Accessibility
Advanced
Customize Ribbon
Quick Access Toolbar
Add-ins
Trust Center
Customize how documents are saved.
Save Documents
AutoSave files stored in the Cloud by default in Word
Save files in this format:
Word Document (*.docx)
Save AutoRecover information every
10
minutes
Keep the last AutoRecovered version if I close without saving
AutoRecover file location:
C:\Users\nik\AppData\Roaming\Microsoft\Word\
Browse...
Don't show the Backstage when opening or saving files with keyboard shortcuts
Show additional places for saving, even if sign-in may be required
Save to Computer by default
Default local file location:
C:\Users\nik\Documents\
Browse...
Default personal templates location:
Offline editing options for document management server files
Saving checked out files to server drafts is no longer supported. Checked out files are now saved to the Office Document Cache.
Learn more
Server drafts location:
C:\Users\nik\Documents\SharePoint Drafts\
Preserve fidelity when sharing this document:
No Documents Open
Embed fonts in the file
Embed only the characters used in the document (best for reducing file size)
Do not embed common system fonts
OK
Cancel



don't like this behaviour, you can disable it by clicking File followed by Options; then click Save in the sidebar, and untick the box beside "AutoSave files stored in the Cloud by default in Word".

More natural handwriting

Microsoft added two new pens to OneNote last year, namely a fountain pen and brush pen – and now they're available in the latest version of Word, as well as Excel and PowerPoint. In Microsoft's words, the fountain pen lets you "flourish", drawing lines of variable thickness depending on speed and pressure, while the brush pen allows you to be more expressive with direction-based thickness.

To find the new pens, click Draw above the ribbon and you should see an Add button at the end of the palette of drawing tools. Click this, and you can select from pen, highlighter, fountain pen, brush pen and pencil.

The Draw tab is also now more customisable than it was in previous releases. Any pen that already exists in your tools palette can now be duplicated (aside from the ink to text pen), allowing you to effectively create your own pen presets. For example, if you're reviewing a document that needs to be amended by two teams, you could duplicate the highlighter by right-clicking it and clicking Add Another Highlighter. You can now adjust the colour option on the drop-down menu to produce a pink highlighter to accompany the yellow highlighter, and use different colours for each team.

Over time, your palette of tools might get long and unmanageable, at which point it makes sense to organise them. Click and hold on a pen to drag it to a new position – perhaps putting your most-used pens on the far left, or grouping pens by type.

TOP Autosaving cloud files means any changes will be visible to others immediately

ABOVE You can add pens to the existing Draw tools, and re-order them as required

Additional tools

A few extra tools deserve a mention. If you're working with documents that other people have commented on, you can now switch between contextual comments and list view. The former shows active notes in context, while any that have been resolved will be hidden. To reveal hidden comments, the list view moves annotations to the Comments pane on the right of the screen and shows everything associated with the active document, resolved or not. Clicking a comment in this pane scrolls the document to the corresponding location.

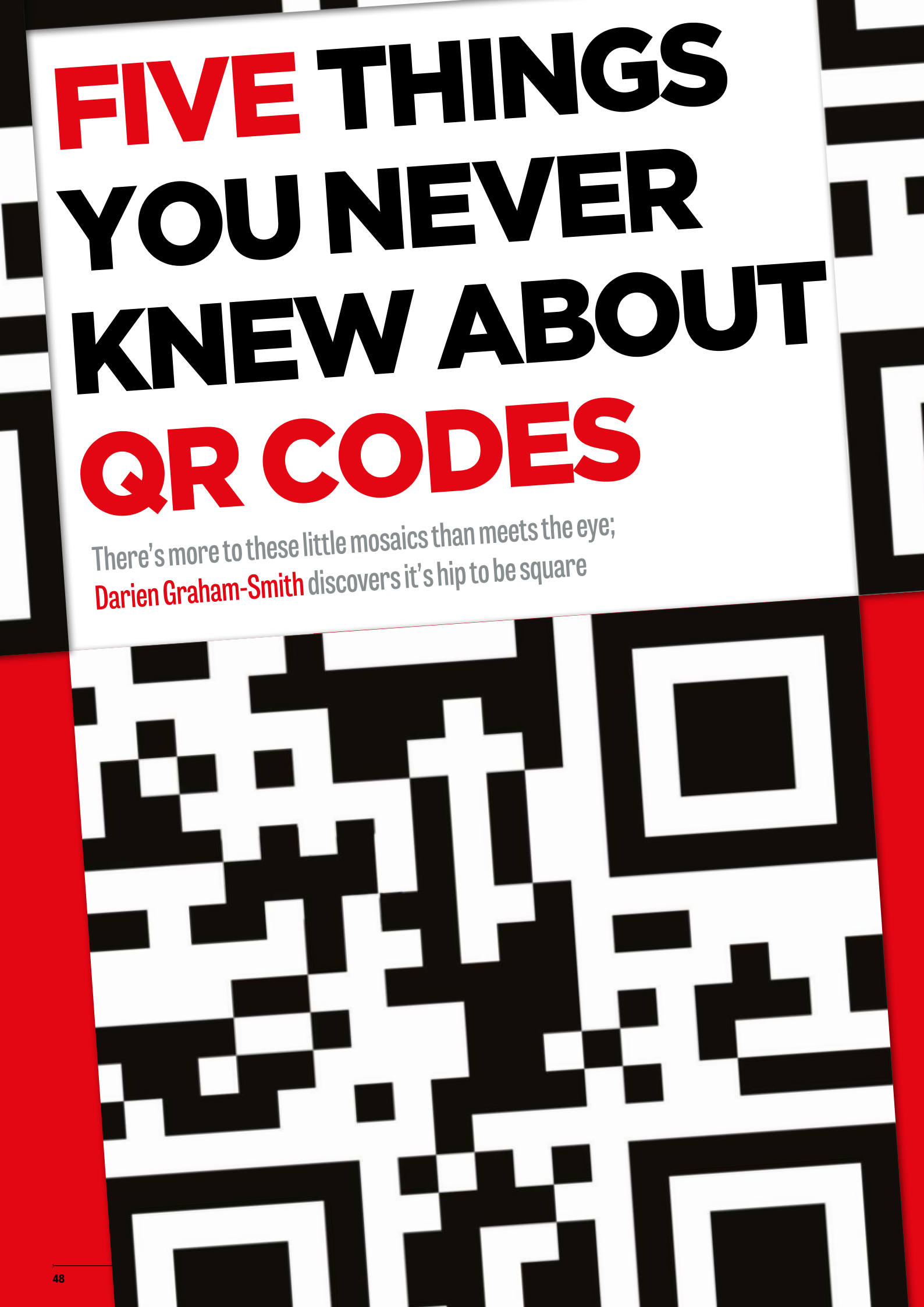
Where a document has a large number of comments from different collaborators, you can also apply filters to reduce the noise. Click the Comments button on the menu bar, then click the Filter drop-down menu and select "Active Only", "Resolved Only" or "@Mentions Me". The last of these will help you to spot only the comments that it's your responsibility to resolve – you can combine it with the other two filters to further trim the results.

If you're using Microsoft 365 for business, there's also a new dynamic watermarking feature that embeds real-time watermarks in documents you need to share. This feature appeared at the tail end of last year, but you may have missed it as you need to apply the watermarks using the Office web apps. To do so, open your document in the browser version of Word, click its name above the ribbon, then click Sensitivity and select an option, such as General, Confidential or Highly Confidential. The document will be overlaid by a repeating watermark that would be difficult to remove from screenshots without considerable editing.

Microsoft 365 apps are updated several times a year, so expect to see new features appearing periodically. New additions may be highlighted by a pop-up, but you can also keep an eye out for announcements on Microsoft's website. The Microsoft 365 blog (**tinyurl.com/375blog**) is a good starting point, and you'll find a rolling list of release notes for each new non-beta version at **tinyurl.com/375notes**. ●

FIVE THINGS YOU NEVER KNEW ABOUT QR CODES

There's more to these little mosaics than meets the eye; Darien Graham-Smith discovers it's hip to be square



LEFT **Custom codes are used for travel tickets**

1 QR codes can encode all types of data

You're already familiar with QR codes as a quick and easy way to access a web link. All right, it can be fiddly to dig your phone out of your pocket, bring up the camera and point it at the code. Or, if you're the one generating the code, it's a little bit of a pain that you have to use a tool to create the image and embed it into your document, poster or wherever. Hopefully, though, we can all agree that using QR codes is a much better way to share addresses then expecting people to type in URLs manually.

QR codes aren't just for web addresses, however. You might also have come across them in the context of Wi-Fi connections. Some routers have stickers on the back that contain the SSID and passphrase, so you just point your phone and scan the code to get online – or you can generate your own code for a particular network and share it with others, so they can connect without having to tap in "x]2bg\I37H7" by hand.

You might wonder what else a QR code can store – and the short answer is absolutely anything. The QR format is a general-purpose encoding system that merely represents a string of digits, alphanumeric characters or binary data. In the example cases above, it's the scanning device that recognises the data type and handles it accordingly. Other established data types include "vCards" that contain a person's name and contact details, GPS co-ordinates and calendar events – but you can store literally anything you like in a QR code.

The only limit in fact is the size of the code – or to be precise the number of "modules" (squares) it contains, since the code itself can be printed at any size. The standard allows for grid sizes between 21 x 21 and 177 x 177 modules, with the biggest codes capable of representing just over 7,000 numeric characters, 4,296 alphanumeric characters or 2,953 bytes of raw binary data. It's this versatility and available density of information that makes QR codes so useful, allowing them to hold any type of data from event and transport tickets to personal ID and payment tokens.

2 QR codes are older than you think

The rise of QR codes as a way to share web addresses might feel like a recent phenomenon, but the system was invented only a few years after the World Wide Web itself. In 1994, an engineer named Masahiro Hara, working for Japanese car firm Denso Wave, set out to make stock control faster and more reliable by creating a new way to electronically read information from item packaging.

Previously the company had been using regular "one-dimensional" barcodes, which can encode only a very limited amount of information (typically 13 numeric characters). This meant that a box containing multiple parts would be labelled with multiple barcodes, each one needing to be scanned separately. Barcodes also need to be scanned in a straight line, with the scanner oriented along the length of the code, making things even more fiddly.

Hara took advantage of the increasing availability of cheap cameras to create a new 2D encoding system. As we've mentioned, his design could store hundreds of times more information than a barcode, and could be read from any angle, allowing workers to capture all the information about a package in an instant. Accordingly, Hara dubbed his invention "quick response codes" – or QR for short.

Hara also took the opportunity to improve reliability, building in error detection and redundancy features so the code could be read even if it was partly obscured or damaged. Four different levels of error correction are supported by the standard: low, medium, quartile and high, allowing accurate reading of the code even if 7%, 15%, 25% or 30% of it is missing or misread. The trade-off is that higher levels of error correction reduce the data density, so you need a bigger code to carry the same information.

You can store literally anything you like in a QR code. The only limit is the size of the code

What really made QR technology take off was Denso Wave's decision to allow anyone to freely make and use standard QR codes. In the year 2000, QR was adopted as an ISO standard, and today all the original IP rights have now expired, meaning you can

RIGHT **QR codes were originally invented for stock control**

Other 2D codes

Micro QR

Designed for the smallest labels, Micro QR codes can hold up to 35 numbers or 21 alphanumeric characters in a tiny code with a single finder in the top-left corner.

Rectangular Micro QR

Rectangular Micro QR (rMQR) codes use the same encoding system as regular QR codes, but are shaped to fit onto packaging and labels originally designed for barcodes. They can be recognised by their large square in the left corner (or left side, as above), and the smaller square in the lower right. Plus, of course, the fact that they're rectangular.

Frame QR

Frame QR codes look like regular QR codes with the middle cut out: they're intended to allow designers to insert their own graphics inside the code, without affecting the code's error-correction capabilities. Unfortunately, they're not recognised by current smartphones, making them less attractive than simply customising a regular code.

Data Matrix

Data Matrix codes don't have finder squares, instead indicating their orientation via a pattern of solid and dotted lines around their edges. Their space-efficient design means they can be much smaller than QR codes, while carrying up to 3,116 characters of either text or binary data. Again, most phones can't natively read Data Matrix codes, but there are free apps that can decode their content if you're curious.

Microsoft Tag

Originally developed back in 2007, Microsoft Tag was a square code that encoded data in patterns of triangles in either four or eight colours. The use of multiple colours means Microsoft Tags can store more information than a similarly sized QR code – they can fit up to 3,500 characters into an inch-square label – but the technology never widely caught on, and support ended in 2015.

HCC2D

"High-capacity coloured two-dimensional codes" are another system that uses colour to increase data density. HCC2Ds look just like QR codes, only more colourful – but their reliance on colour makes them more susceptible to errors than black and white codes, especially in poor lighting. Proposed back in 2014, HCC2D codes haven't found mainstream adoption, and at this point it seems unlikely they ever will.

not only create your own QR codes, but also produce derivative codes and develop the technology in your own direction if you wish. For example, **thetrainline.com** uses its own e-ticket format that's clearly based on QR technology, but which uses a custom encoding system that makes it harder to fake and spoof tickets.

3 QR codes can be heavily customised

QR codes are instantly recognisable by their square shape, their black and white mosaic design and the three big squares ("finders") in the corners. Yet it's quite possible to make them look more interesting if you so wish. The error correction that's baked into the codes means they'll continue to work even if part of the area is covered by an image or logo. For example, if you create a QR code in the Chrome browser – by opening the application menu and selecting "Cast, save and share | Create QR code" – you'll see that the generated code features a funky pixellated dinosaur in the middle, an emblem that Masahiro Hara certainly did not include in the original specification.

You can also take liberties with the design; for example, Chrome QR codes use round black dots on a white background instead of squares, and you can experiment with different colours to make your code friendlier than the rather industrial standard design.

ABOVE Using free tools you can create and customise your own QR codes

There are various free online QR code generators that let you play with logos and design; one option that offers lots of variations is **qrcode-monkey.com**. Alternatively, you can experiment in any paint program, by taking a standard code and applying your own adjustments. You can use your phone to check that the code still works, but don't push it too far – if a code is at the edge of readability on your screen and with your phone, it might not work at all for someone using different devices.

4 QR codes don't always have to link to one place

QR codes are static, in the sense that they convey predefined information that can't ever change. If you scan a QR code in 100 years' time with your Samsung Galaxy S125 smartphone, you'll get the exact same information as you would today (although it's an open question whether the destination website, or the World Wide Web itself, will still exist).

In one sense this makes QR codes very reliable and secure (although see "QR security", right). However, their fixed nature raises a potential issue if you're sending codes out into the world for public consumption, which might remain in circulation for many years. After all, you don't want old codes floating around pointing to outdated pages or dead links.

The solution is to use redirection. Instead of hard-coding the address of your desired web page directly into your QR code, make it link to an interstitial page that redirects visitors to the intended site. You can then update this page at any time to change the effective destination of the code, so it can always point to the latest version of your CV, your online showreel, your list of items for sale or whatever – even if your content moves to a totally different location.

The only catch here is that you need to control the "landing page" that the QR code links to. Third-party shorteners such as **tinyurl.com** don't usually let you change the destination of a link once it's been created. This is to deter scammers from creating "bait and switch" attacks where a legitimate link is widely spread and shared, then – once it becomes popular – abruptly switched to a malware or phishing site. Other services, such as **bit.ly**, only allow redirection editing for paying users.

By far the easiest solution is to use your own website, if you have one. Just make your QR code point to a page within your own domain that contains the following code:

```
<!DOCTYPE html>
<html>
<head>
<meta http-equiv="refresh" content="0;
url=https://www.destination.com/
mypage">
<title>Redirecting...</title>
</head>
<body>
<p>If you're not redirected automatically,
please <a href="https://www.destination.
com/mypage">click here</a>.</p>
</body>
</html>
```

This gives you full control, and will work for as long as your website is active; you can update the destination address at any time, with instant effect.

If you don't already have a web host and domain name then setting one up will obviously be an expense, but it doesn't have to be a huge one. The code above comes to just 294 bytes, so you can get by with the tiniest of storage and bandwidth allowances. And if you're setting up a site purely for forwarding purposes, there's no need to pay big bucks for a prestige domain name. After all, no-one will ever need to enter it, or even see it beyond the brief moment while they're being redirected.

As well as letting you route traffic wherever you want, using redirects allows you to collect statistics about traffic coming from QR codes. Most hosting packages offer analytics that can track how many "hits" your redirect page is getting – so you can see how many people are scanning your QR code, even if it's ultimately taking them to a remote site.

For more granular tracking, you can create multiple redirect pages, all pointing to the same destination but accessed via QR codes. In this way a small business could, for example, see how many people are scanning the QR code from a promotional flyer, versus one in a printed brochure.

LEFT Website analytics help you track how often your QR codes are being scanned

5 QR codes may soon replace barcodes

Although QR codes were specifically invented to replace barcodes, we're still using the old technology 30 years later. But barcodes may finally be on the way out: a project called "Sunrise 2027", promoted by GS1 – the independent industry body that develops supply chain standards – aims to ensure that retailers around the world can read QR codes as well as old UPC labels by the end of 2027.

This will not only help speed up checkouts, with fast, reliable scanning; it will also allow far more information to be encoded into product packaging. Goods handlers at every step of the supply chain, from manufacture to retail, will be able to scan a code and see not only the unique product code but other key information such as the lot number and expiration date. This obviously creates huge potential for improved automation and tracking.

The Barcode Just Got Better.
Get expanded information about products faster. Unlike traditional barcodes, 2D barcodes powered by GS1 Digital Link give you immediate access to what you need to know and want to know with a single scan.
Scans at checkout
Is it expired?
Is it cruelty free and sustainable?
Is it healthy?
Is it part of a recall?
Can I get a coupon for it?
Will I be allergic to it?
Can I recycle it? How?
Scans at checkout

BELOW The industry body GS1 is keen for retailers to move to QR codes

But this isn't just for the benefit of the industry: there will also be more information for consumers. As well as use-by dates, QR product codes can include at-a-glance details of ingredients, allergens, country of origin and more, and companies can embed their own web links, for promotions, loyalty schemes or interactive information sources.

Supermarkets are already updating their point-of-sale hardware in preparation, with some larger retailers allowing customers to use their own smartphones to scan items as they shop – meaning all that's needed is a simple app update. ●

QR security

You might think there's not much that can go wrong with a QR link – after all, it's basically the same as printing a URL in plain text, right? But there's one big difference: since QR codes aren't readable by humans, a person scanning one has no way of knowing exactly where it will take them.

You can inspect the URL before interacting with the destination site, but this isn't always easy on a mobile browser, and you could end up on a fake site without realising it. We've also heard of scammers printing out their own QR codes and sticking them over the top of legitimate codes. If you don't look carefully, a genuine poster or ad could have been hijacked with a fake code that takes you to a phishing page and steals your personal information.

Even with completely original QR codes, the permanency of the medium introduces an element of risk. If an old code points to an expired address, someone else could register the target domain and put their own landing page in place of the defunct real one. In this scenario there really is no way for an innocent visitor to tell if they're being tricked; if you're a QR creator, your best practice is simply to keep your domain active for as long as possible, and ideally give visitors confidence by including a description of what they should expect to see after scanning. For example, if you put "visit my personal website" next to the code, visitors will know to be suspicious if they arrive instead at what looks like a payment portal.

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Fairphone 6

The only choice for environmentally minded people, but also a solid mid-range Android phone in its own right

PC PRO RECOMMENDED

SCORE ★★★★☆

PRICE £416 (£499 inc VAT)
from fairphone.com

Fairphone has always sought to offer the most eco-friendly smartphones on the market. In the Fairphone 6, that shows in the use of recycled materials wherever possible, in production processes that support fair working conditions, and in using energy from renewable sources. What's more, as with past models, it's easy to replace and repair parts yourself, and with this new generation you can also add a range of accessories, such as a finger loop, a card holder or a lanyard.

The standard handset costs £499 – a welcome step down from the £649 of 2023's Fairphone 5 (*see issue 355, p44*). That makes this a competitive smartphone in its own right, especially since it comes with 256GB of storage. There's even a "de-Googled" version for an extra £50 that comes with the open-source /e/OS instead of Android.

Chunky design

Like past models, the Fairphone 6 has a thicker body than most phones at 9.6mm. The phone and accessories come in white, green and black; my review unit was white with green accessories. This proved an attractive combo, but I found the white handset picked up marks and stains easily.

The buttons and connections are mostly as you'd expect. There's no 3.5mm audio jack – Fairphone ditched that years ago when everyone else did – but you can listen to music over Bluetooth 5.4, or using a USB-C adapter. One nice surprise is the inclusion of a microSD slot for adding extra storage, a rare feature nowadays. The fingerprint sensor is embedded in the power button, rather than under the screen as is now common, but I didn't mind this as it proved quick and reliable in use.

There's also a configurable slider on the right edge of the phone; you can choose what this does from the Settings menu, with options including activating do-not-disturb mode, controlling the torch or bringing up Fairphone Moments, a quick-access menu with links to useful apps and functions.

ABOVE Sturdy, easily repairable and with a five-year warranty, this is a device that's built to last

BELOW The phone comes in a choice of white, green or black

The plastic casing feels extremely solid, with MIL-STD-810H certification to withstand extremes of altitude, temperature and humidity, as well as intense shocks. You hopefully won't need these protections, but they make this feel like a phone that doesn't need a case. There's even a five-year warranty, far superior to what any other manufacturer offers. However, this doesn't protect against accidental damage, and as the Fairphone 6 is only IP55 certified against dust and liquid ingress you'll need to be careful.

Full repair body

If something does go wrong, the Fairphone 6 offers the unique selling point of being fully repairable – not only by a technical specialist, but by anyone. If any part of your phone gets damaged you can easily buy a replacement on Fairphone's website and install it using a single screwdriver, with the help of the company's video tutorials.

The same applies to accessories: you can remove the standard back panel and replace it with one featuring

the card holder, finger loop or similar. This is perhaps the Fairphone 6's most distinctive feature, adding an element of fun to what is otherwise quite a functional design.

Compared to the huge screens of some Android phones, the Fairphone 6 feels compact, with a 6.3in display that matches the iPhone 17 (*see p70*) in size. Its maximum brightness of 1,400cd/m² is fine, but not as bright as many rivals: I wouldn't have minded a bit of extra shine on sunny days. Most of the time, though, the display looks great. Its plastic OLED (POLED) panel produces lovely colour and contrast, with a sharp dot pitch of 432ppi and a smooth 120Hz refresh rate.

Clean Android

Aside from repairability, another thing that's unusual about Fairphone phones is that they come with an absolutely stock Android installation – not some customised or forked variant. The Fairphone 6 runs Android 15 and supports all its headline features such as live location sharing, dodgy text warnings and screen-time tracking. If you like a clean interface with no added bells and whistles, you'll love starting out with zero bloatware and building up your app library just how you like it.

The one thing Fairphone does preinstall is its own app, which offers a few useful features. You can view device information with a tap, instead of having to hunt through the Settings menu, and access quick links for ordering spare parts and accessories, along with installation guides. A device health monitor provides insight into the phone's internal operations, such as how much memory and storage you've used up, and what the phone's temperature is. Software support is promised for the next seven years, which will take you up to Android 22. So this is a phone that will last – with one caveat.

Speed humps

That caveat is the processor. As is usual with Fairphone's mobiles, it uses a mid-range chip – in this case, a Snapdragon 7s Gen 3, as previously seen in the Nothing Phone 3(a) Pro (*see issue 368, p76*). It's paired with 8GB of RAM, which is less than you'll get on the latest high-end models, but there's enough power to whip through everyday tasks and hop between apps without stuttering. In Geekbench 6, the Fairphone 6 achieved an average multicore score of 3,430, which is par for the course with this chipset. My question mark is how well it will cope with Android 22 when it comes along.

For now, though, this is a solid chip that's even capable of handling smooth gaming, as long as you don't want to enable all the top graphics options.

Fairphone claims the battery will keep you going for "almost two days" on a full charge. Based on personal experience I'd say it's more like one full day, or a little longer if you're not an intensive user, but that's good enough for me. And, of course, once your battery starts to lose capacity over time you can buy a new one for an absurdly reasonable £35, and very easily install it yourself. The phone recharges at 30W, which is again slower than rivals – you'll have to wait for well over an hour to get from empty to full. Sadly there's no support for wireless charging.

ABOVE Swapping out the battery is a simple task requiring just a single screwdriver

Mixed cameras

The Fairphone 6's main camera is a 50MP f/1.6 snapper, accompanied by a 13MP f/2.2 ultra-wide unit. Those specs are fine for a low-cost phone, but photography lovers should steer clear. Images have plenty of detail but not much in the way of vibrancy, with flat colours except in the sunniest settings. Even in well-lit scenarios, I found the greens of a natural landscape blurred together.

One reason for the lack of impact is that Fairphone applies minimal post-processing compared to others. I improved my images by calling up the Edit menu and manually dialling up the contrast, and while I appreciate the purity of Fairphone's approach I don't want to have to do that with every shot I take.

Where the Fairphone 6 impresses most is its portrait mode. The overall impression was still a tad drab, but the background blur was beautifully precise, with realistic variations in intensity depending on the distance from the phone – presumably thanks to the built-in distance sensor.

Unfortunately, macro shooting didn't work so well. Like most phones in this price range, the Fairphone 6 uses the ultrawide lens for close-ups, but the result is a lower-res image that lacks the depth-of-field effect you'd see with a real macro lens. I quickly settled on turning off macro mode and using the main camera for everything.

The 32MP selfie camera is perfectly fit for purpose, but snaps still looked a little washed out. Video recording is supported at 4K at 30fps or 1080p at 60fps, with the option to step up to 120fps at 1080p for slow-mo shooting.

"Once your battery starts to lose capacity you can buy a new one for an absurdly reasonable £35, and very easily install it yourself"

BELOW The standard back panel can be replaced with a card holder or finger loop

Final decision

Technically speaking the Fairphone 6 isn't anything special, but what sets it apart is its lasting power. The fact that you can repair broken or failing parts – and extend the storage as needed – means you can keep using it for far longer than other phones.

Bear in mind, though, that, while you can replace many parts of this phone, the processor and RAM are fixed. Performance is acceptable today, but before the end of the seven-year support period rolls around the Fairphone 6 might struggle to keep up with the latest OS and app updates. Similarly, the camera already looks mediocre next to today's best phones; a few generations down the line, it's liable to feel positively archaic.

However, the point here is sustainability, and it really is a great feeling to step off the upgrade treadmill and pick up a phone that you can keep using almost indefinitely. **TOM BEDFORD**

SPECIFICATIONS

8-core (2.5GHz/2.4GHz/1.8GHz) Qualcomm Snapdragon 7s Gen 3 chip • 8GB RAM • Adreno 810 graphics • 6.3in 120Hz OLED screen, 1,116 x 2,484 resolution • 5G • 256GB storage • microSD cards slot • IP55 rating • dual 50MP/13MP rear cameras with TOF 3D sensor • 32MP front camera • Wi-Fi 6E • Bluetooth 5.4 • NFC • removable 4,415mAh battery • USB-C 2 connector • Android 15 (8 major updates) • 73 x 9.6 x 157mm (WDH) • 193g • 5yr warranty

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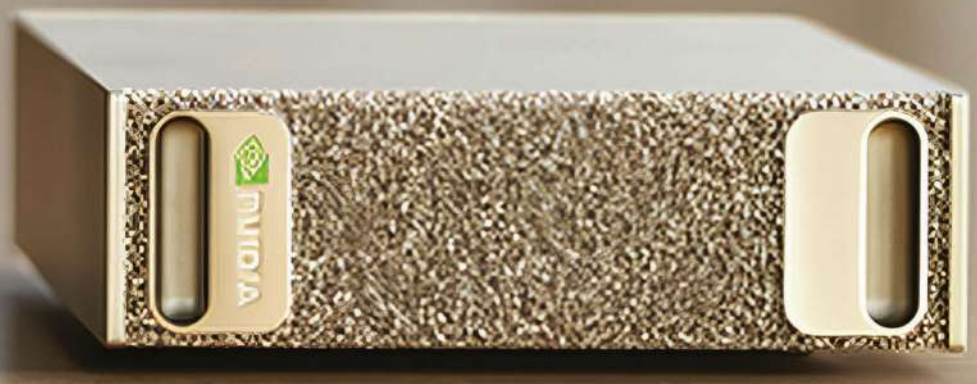

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Acer Swift Edge 14 AI

This is a stylish, well-built and long-lasting choice for anyone seeking a powerful, sub-1kg laptop

PC PRO RECOMMENDED

SCORE ★★★★★

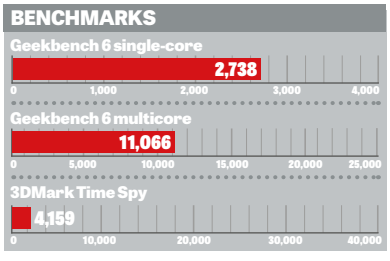
PRICE £999 (£1,199 inc VAT)
from currys.co.uk

Windows laptops must work hard to lift themselves from the pack these days. Sometimes that comes in ultra-slim designs such as the Honor MagicBook Art 14 (*see issue 373, p59*), sometimes in twistable form factors such as the Lenovo Yoga 9 2-in-1 opposite. Here, Acer complements its usual aggressive pricing with a striking white design – note the embossed zigzag patterns on the lid – and a high-quality matte display.

The Swift Edge 14 AI isn't slim by modern standards, measuring 16.6mm compared to 11.5mm for the MagicBook, but that creates more room for cooling. This is evident in the extra power Acer draws from the Core Ultra 7 258V processor compared to the Yoga, with 11,066 in Geekbench 6's multicore section versus 9,929, and 621 in Cinebench 2024 compared to 468. Honor uses a Core Ultra 7 255H chip with 16 cores to the 258V's eight, and was faster still: 14,295 in Geekbench 6 and 773 in Cinebench.

Where Acer wins is gaming. Take *Shadow of the Tomb Raider* with High settings: the Swift Edge averaged 45fps at 1080p versus 26fps for the Yoga and 25fps for the MagicBook, and also raced ahead in *Dirt 5* at 1200p with 35fps at High settings compared to 23fps for the Yoga and 33fps for Honor's offering.

BENCHMARKS



BATTERY LIFE

You also get more ports, with the left-hand side offering two Thunderbolt 4/USB-C 4 ports, a full-size HDMI 2.1 output and one USB-A 3.2 Gen 1 port. The right-hand side is home to a second USB-A port, 3.5mm combo jack and activity LEDs.

This is a Copilot+ PC, but most people are surely more likely to use the webcam special effects than Microsoft's live translation and Recall features. The Swift Edge's 1080p IR webcam needs help, too, with a noisy image. Nor am I convinced by Acer's AI-enhanced PurifiedVoice setting for cutting out background noise: it's effective, but adds an unwelcome echoey ambience. Acer's speakers are another weak point, with subdued vocals and poor handling of high notes.

I can live with such things; what I can't live with is a poor screen, and thankfully this is one area where Acer has invested. It's an AMOLED panel but unusually with a matte finish: that means you benefit from rich blacks while minimising reflections. Colour coverage is excellent, with 100% of the DCI-P3 gamut in view, while accuracy is superb with an average Delta E of 0.31. I measured its peak brightness with SDR content at 386cd/m², but DisplayHDR 600 certification means it can hit 600cd/m² in localised areas when viewing HDR films and games. I also appreciate the 120Hz refresh rate, 2,880 x 1,800 resolution and support for touch, while the fact the lid folds flat 180 degrees could come in useful.

There is little to say about the keyboard other than that it isn't irritating; it's quiet to type on, there's plenty of backlighting and Acer makes no silly layout errors. It just lacks the high-end, cushioned feel of the best keyboards.

ABOVE **The Swift Edge 14 AI is a superb Copilot+ laptop at a very reasonable price**

LEFT **The striking zigzag lines on the lid help the laptop stand out from the crowd**

With its slick glass-coated touchpad, I'd be happy to use the Swift Edge 14 AI on the road, and 14-hour battery life suggests I'll give up before it will. I was also impressed to see it recharge from empty to around 85% within an hour. Throw in a 980g weight and the Swift Edge 14 AI is well suited to life on the move. I'll be interested to see how the white finish looks after a couple of years, but early signs are promising thanks to excellent build quality. There's flex in the lid, but that can absorb knocks, and Acer claims MIL-STD-810H certification.

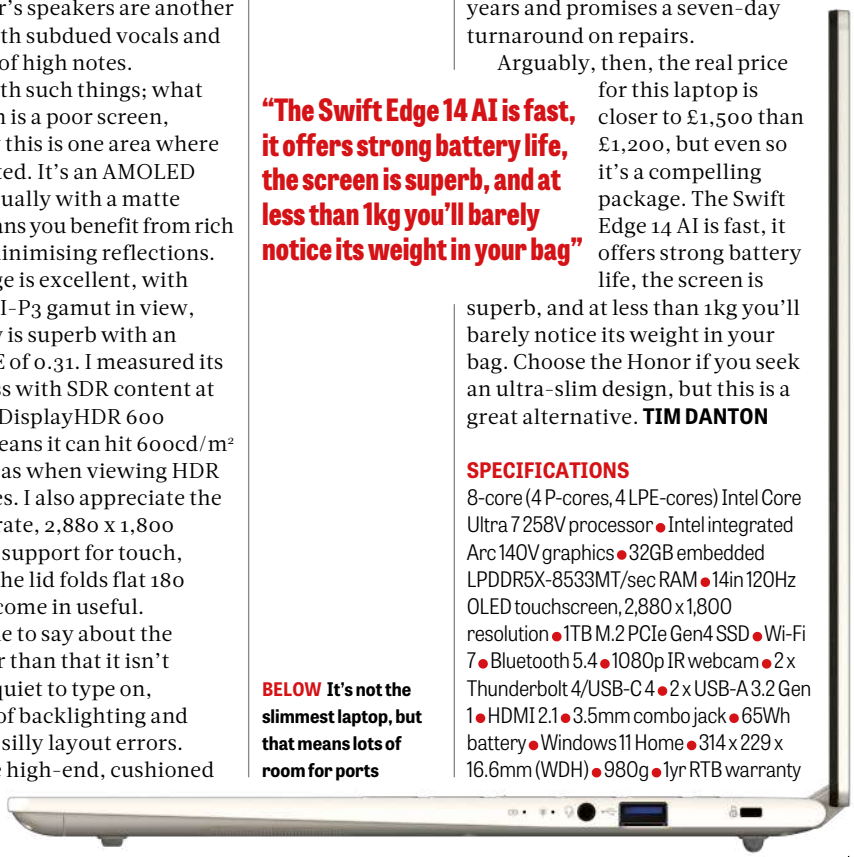
One word of warning: Acer only provides a year's warranty, and this laptop won't be easy to repair if it does go wrong. Removing eight Torx screws grants access to the insides, and it's simple to replace the battery and supplied 1TB SSD, but consider paying £270 for Currys' extended warranty – this covers you for three years and promises a seven-day turnaround on repairs.

Arguably, then, the real price for this laptop is closer to £1,500 than £1,200, but even so it's a compelling package. The Swift Edge 14 AI is fast, it offers strong battery life, the screen is superb, and at less than 1kg you'll barely notice its weight in your bag. Choose the Honor if you seek an ultra-slim design, but this is a great alternative. **TIM DANTON**

"The Swift Edge 14 AI is fast, it offers strong battery life, the screen is superb, and at less than 1kg you'll barely notice its weight in your bag"

SPECIFICATIONS

8-core (4 P-cores, 4 LPE-cores) Intel Core Ultra 7 258V processor • Intel integrated Arc 140V graphics • 32GB embedded LPDDR5X-8533MT/sec RAM • 14in 120Hz OLED touchscreen, 2,880 x 1,800 resolution • 1TB M.2 PCIe Gen4 SSD • Wi-Fi 7 • Bluetooth 5.4 • 1080p IR webcam • 2 x Thunderbolt 4/USB-C 4 • 2 x USB-A 3.2 Gen 1 • HDMI 2.1 • 3.5mm combo jack • 65Wh battery • Windows 11 Home • 314 x 229 x 16.6mm (WDH) • 980g • 1yr RTB warranty



BELOW **It's not the slimmest laptop, but that means lots of room for ports**

Lenovo Yoga 9i 2-in-1 Gen 10 Aura Edition

This sleek 2-in-1 convertible is well suited to creative applications, but its quality comes at a price

SCORE ★★★★☆

PRICE As reviewed, £1,427 (£1,712 inc VAT) from lenovo.com

The obvious question when buying a 2-in-1 convertible laptop is what you're going to use it for in tablet mode. Some basic units are only suitable for doodling and scribbling notes, but the Yoga 9i is here for creative tasks: the bundled stylus is one of the best, with minimal lag and a magnetic finish that means it sits firmly against the lid when in transit. However, you still need to charge it via USB-C.

Lenovo's top-end models include an OLED panel with a phenomenal 3,840 x 2,400 resolution. That would normally be overkill for a 14in laptop, but you may find yourself leaning in close to admire the results of your artistic creations. I couldn't make out the pixels even from a couple of inches away. It's a high-quality screen, too, with excellent colour coverage – 97% of the Adobe RGB gamut falls under its sway with impeccable accuracy, as shown by an average Delta E of 0.56.

As is often the case with OLED screens, it's sensitive to viewing angles, but whites look good if you pump it near to its full 394cd/m² brightness. Note that cheaper models include a lower-resolution OLED screen, but Lenovo claims this reaches 500cd/m² with a peak HDR brightness of 1,100cd/m² (compared to the 600cd/m² of our unit). It also ups the refresh rate to 120Hz, but I didn't notice the 60Hz limit of my test device.

Then we come to the speaker setup, which is simply phenomenal. Along with a pair of 2W tweeters built into the hinge mechanism, so they're pointing towards you whether in tablet or laptop mode, Lenovo packs a pair of 2W woofers into the base. With the Yoga 9i, you won't merely tolerate music, you'll genuinely enjoy listening to it.

The microphones are also excellent, but I was disappointed by the image quality from the 5MP webcam. It's fine for web calls – great compared to laptops of two years ago – but compression was evident even when I upped the resolution to 1440p.

Lenovo has increased the quality of its Yoga keyboards to the point where I struggle to differentiate this one from a slim ThinkPad's. The 1.5mm of travel and subtle cushioning minimise errors, and the key caps have a slight dip in the centre that ensure your finger falls naturally into place. The biggest sacrifice compared to ThinkPads is that the four cursor keys are squashed into the bottom row, making the up/down arrows tough to hit. Nor is there a TrackPoint, but with a large and responsive glass-coated touchpad – not haptic, which is arguably a plus as I find a normal trackpad easier when dragging and dropping files – few will complain.

Besides, there are plenty of ports if you wish to add a mouse. Most of the action happens on the left, where you'll find two Thunderbolt 4/USB-C 4 ports along with a USB-A 3.2 Gen 2 port. That supports up to 10Gbits/sec transfers, while the sole USB-C 3.2 Gen 2x2 port on the right doubles that to 20Gbits/sec. It's kept company by a 3.5mm jack and power button. With Wi-Fi 7 and Bluetooth 5.4, connectivity is a clear win for the Yoga 9i.

Build quality is again superb, with the aluminium alloy chassis finished in a deep "Cosmic Blue" that's resistant to scratches. I wouldn't hesitate to sling it into a bag, and with a 1.3kg weight and 15.9mm thickness it's a fine choice for daily commuters. Add battery life that stretched to over 16 hours in our tests and it will keep on going, too.

You can replace the battery yourself when it degrades (although you'll need a Torx screwdrivers and patience to remove the base cover), likewise the M.2 2242 SSD, a speedy 1TB Gen4 disk with almost 7,000MB/sec sequential reads and writes.

As always with Core Ultra chips the 32GB of RAM is embedded onto the CPU package, with the Core Ultra 7 258V present here. Lenovo doesn't squeeze as much out of its eight cores as Acer in the Swift Edge opposite, but good luck noticing this in practice. Well, except when playing games, where the Yoga 9i stuttered to around 30fps in both *Dirt 5* and *Shadow of the Tomb Raider* even with Low settings.

In fact, I'd be tempted to save money and buy a Core 256V machine with 16GB of RAM, as you aren't buying all-out speed here but form factor. And while the OLED panel drops to a 2,880 x 1,800 resolution, it will still look sharp – and the price then drops to £1,363 inc VAT from £1,712. Or roughly that: Lenovo has an annoying habit of varying its online discounts, so you may find the price varies by up to £100 either way.

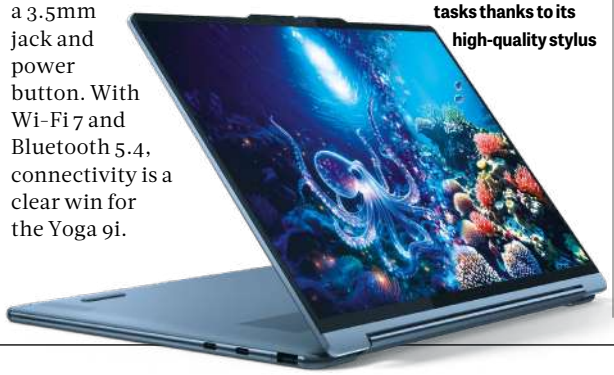
Whichever model you choose, you would be wise to extend the warranty from the single year of on-site cover: as I write, upgrading to four years costs a bargain £108. This adds to an already high purchase price, but that's also reflected in the quality of this 2-in-1. If you want a 14in convertible for creative tasks, the Yoga 9i 2-in-1 Gen 10 is this year's standout offering. **TIM DANTON**

ABOVE A fine screen, phenomenal speakers and decent battery life make this a winner

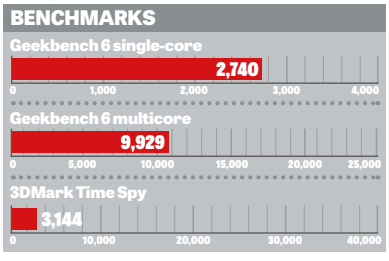
PC PRO RECOMMENDED

"I wouldn't hesitate to sling it into a bag, and with a 1.3kg weight and 15.9mm thickness it's a fine choice for daily commuters"

BELOW The Yoga 9i is well suited to creative tasks thanks to its high-quality stylus



BENCHMARKS



BATTERY LIFE

SPECIFICATIONS

8-core (4 P-cores, 4 LPE-cores) Intel Core Ultra 7 258V processor ● Intel integrated Arc 140V graphics ● 32GB embedded LPDDR5X-8533MT/sec RAM ● 14in 60Hz OLED touchscreen, 3,840 x 2,400 resolution ● 1TB M.2 PCIe Gen4 SSD ● Wi-Fi 7 ● Bluetooth 5.4 ● 1440p IR webcam ● 2 x Thunderbolt 4/USB-C 4 ● USB-C 3.2 Gen 2x2 ● USB-A 3.2 Gen 2 ● 3.5mm combo jack ● 75Wh battery ● Lenovo Slim Pen ● USB-C 3-in-1 hub ● 14in sleeve ● Windows 11 Home ● 316 x 220 x 15.9mm (WDH) ● 1.3kg ● 1yr C&R warranty ● part code, 83LCCTO1WWGB4

HP OmniBook 5 NGAI 14in (Snapdragon)

This well-built Snapdragon laptop with an OLED panel has much to recommend it – at its discounted price

SCORE ★★★★☆

PRICE £499 (£599 inc VAT)
from currys.co.uk

At £599, the HP OmniBook 5 is the cheapest Copilot+ PC we've tested. That assumes that Currys sticks to its price as we go to press, with the unit's official RRP listed as £799, but that seems a fair assumption.

One reason it's so cheap is that it uses Qualcomm's pared-back Snapdragon X X1-26-100 processor, which we first saw in the £999 Acer Aspire 16 AI (*see issue 374, p56*). Application performance is pretty good overall, being roughly equivalent to Intel's Core Ultra 7 256V chips. What's more, it has exactly the same NPU as the rest of the Qualcomm range, easily meeting Microsoft's criteria for Copilot+ PC status.

The big trade-off is GPU power. The Adreno X1-45 was between 45% and 50% slower than the X1-85 GPU in the Snapdragon X Elite chips in our suite of tests, and that's hardly an impressive performer in the first place. Put the X1-45 up against Intel's Core Ultra 7 and it lags anything from 60% to 80% behind. You'll struggle to get run any demanding games at acceptable frame rates.

Battery life, on the other hand, is stupendous. The Snapdragon chip and a relatively large 65Wh battery pushed the OmniBook 5 to 20hrs 40mins in our light-use rundown test. In my day-to-day usage, that translated into almost two working days with Wi-Fi enabled and living mostly in the Chrome browser.

More good news comes in the form of its dainty 12.6mm thickness. While 1.3kg isn't super-light, the sandblasted matte silver metal frame feels solid from top to toe, making for a portable little package. There is flex in the base and lid, but nothing I'd worry about when commuting.

Connectivity is minimal but ample. There are two 10Gbits/sec USB-C ports on the left-hand flank, and a drop-jaw 10Gbits/sec USB-A port on the right, alongside a 3.5mm headset connection. You also get Wi-Fi 6E and Bluetooth 5.3 connectivity.

There's a 1080p webcam, too, replete with a privacy shutter. The image quality is very middle of the road, however. There's no fine detail to speak of, and colours look oversaturated: my skin tone looked excessively flushed and reddish.

A set of stereo speakers fire downwards from under the front edge. These go loud, but it's a rough and ready noise – there's no delicacy or body to make music pleasant to listen to.

HP has produced some of my favourite keyboards in recent times, and the OmniBook 5 is no exception. The chiclet keys feel good, with a light, snappy feedback, and the chiclet design makes for a keyboard that feels spacious. The only mild disappointment is that you don't get a full-height Enter key. The up and down cursor keys are also crushed into a single height row, but that's hardly a unique compromise in 2025.

The touchpad is a standard mechanical type, and that's fine. Multifingered gestures work reliably, with the only oddity being that the touchpad rattles with the tiniest amount of pressure. This may be intentional, though, as it means you get audible and physical feedback with even the lightest taps.

Then we come to the star inclusion: the OLED display. The 1,920 x 1,200 resolution means text isn't the sharpest, but it delivers a 299cd/m² peak brightness (that's fine for OLED panels due to their strong contrast), 99% DCI-P3 coverage, and a near-instantaneous 0.2ms response time. Colours are wonderfully vivid and accuracy solid, with an average Delta E of 1.63 and a white point of 6356K, which is almost dead on the ideal of 6500K.

ABOVE Great battery life and a superb OLED screen help the HP OmniBook 5 stand out

"Colours are wonderfully vivid and accuracy solid, with an average Delta E of 1.63 and a white point of 6356K"

The OmniBook 5 14in finds itself flanked by a queue of capable challengers. If, for instance, you spend all your time working in a browser, you could get a similarly refined experience from the Lenovo Chromebook Plus Gen 10 (*see issue 374, p54*) – and that's only £549. And if you don't mind shifting to macOS, there's always the £849 MacBook Air.

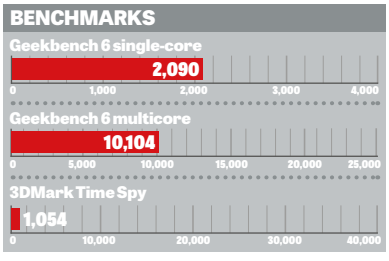
Such distractions aside, the OmniBook 5 is a great all-around laptop for the price. If the software you use runs happily on Windows on Arm systems, then the OLED display, good ergonomics and huge battery life may be everything you want. **SASHA MULLER**

LEFT The high-quality keyboard is another plus point

SPECIFICATIONS

8-core Qualcomm Snapdragon X X1-26-100 processor ● Qualcomm Adreno X1-45 graphics ● 16GB LPDDR5X RAM ● 14in 60Hz, 1,920 x 1,200 non-touch OLED panel ● 512GB M.2 PCIe Gen4 SSD ● Wi-Fi 6E ● Bluetooth 5.3 ● 1080p IR webcam ● 2 x USB-C 3.2 Gen 2 ● USB-A 3.2 Gen 2 ● 3.5mm combo jack ● 65Wh battery ● Windows 11 Home ● 312 x 218 x 12.6mm (WDH) ● 1.3kg ● 1yr C&R warranty ● part code, 14-he0001na

BENCHMARKS



BATTERY LIFE

BELOW Ports include two 10Gbits/sec USB-C ports and a 10Gbits/sec USB-A connector

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Nvidia GeForce RTX 5050

Entry-level Blackwell card brings a much-needed performance boost, but not enough to justify its price

SCORE ★★★☆☆

PRICE Gigabyte Nvidia GeForce RTX 5050 Windforce OC, £200 (£240 inc VAT) from scan.co.uk

In some ways, the GeForce RTX 5050 is stuck in time. Just like the RTX 3050, it has 2,560 CUDA cores, and while the latest Blackwell architecture is much more capable and clocked higher (2,572MHz boost versus 1,780MHz), that number feels low compare to the 3,840 CUDA cores of the RTX 5060 – a card that typically costs around £50 more.

What's more, unlike the RTX 5060 and every other RTX 50-series card, the 5050 sticks to GDDR6 memory rather than GDDR7. This affects memory bandwidth, with 320GB/sec versus 448GB/sec for the 5060, but AMD's Radeon RX 9000-series cards all stick with GDDR6 and still deliver competitive performance with RTX 50-series products at similar price points.

Nvidia doesn't make reference cards for the RTX 5050, so we chose the Gigabyte Windforce OC variant. This lacks frills such as RGB LED lighting or heavy-duty metal shrouds, but we appreciate this card's compact 199 x 116 x 40mm dimensions: it will fit into most cases with ease. The single 8-pin power connector is located toward the rear of the card, meaning PCIe power cables will have to stretch, but otherwise it's a solid advert for Nvidia's GPU.

It also provides sensible cooling, with a proper aluminium stack rather than a cast affair, and two beefy copper heat pipes run through it to transfer heat from the GPU. I'm confident that it offers a fair representation of the RTX 5050's turn of pace.

Using a system based on an AMD Ryzen 7 9800X3D with 32GB of DDR6-6000 RAM, I tested this card against its rivals across 13 games without ray tracing and seven with ray tracing enabled. You can see a summary of the results below, but I would flag the 58% improvement in average frame rates versus the RTX 3050 at 1080p without RT enabled. This effectively ties with the similarly priced Arc B580, and also means it clears a 60fps average across our range of test titles. The one notable exception is *Flight Simulator 2024*, which averaged 33fps; this game really needs 16GB of video RAM.

For consistent speeds at 1440p, you need to step up to a Radeon RX 9060 XT 16GB or RTX 5060 Ti 16GB, even with DLSS or FSR in play. 4K proved well beyond the RTX 5050 in our test suite, averaging a pitiful 18fps.

Ray-tracing performance is mixed. It averaged 36fps at 1080p, managing playable frame rates in *Doom: The Dark Ages* (56fps), *Indiana Jones and the Great Circle* (66fps) and *GTA V Enhanced* (72fps). But *Alan Wake II* (14fps), *Black Myth: Wukong* (22fps) and *Cyberpunk 2077* (29fps) all struggled. These are at demanding settings, but even so you should budget for an RTX 5060 Ti if you're serious about ray tracing.

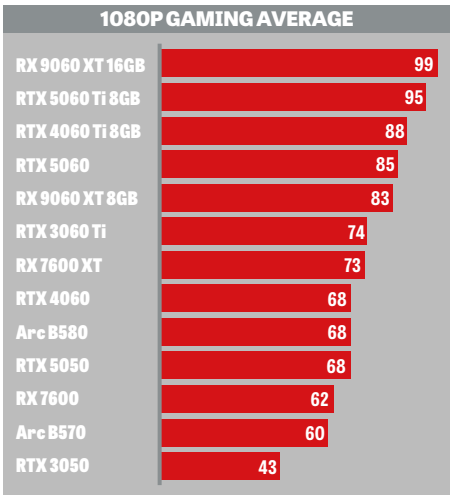
ABOVE The RTX 5050 will be fine in a prebuilt system, but upgraders should avoid it

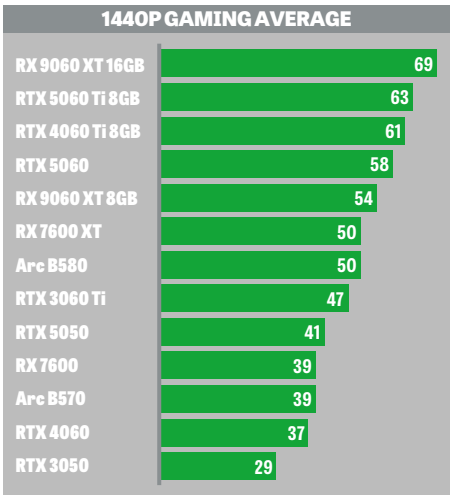
"Unlike the RTX 5060 and every other RTX 50-series card, the 5050 sticks to GDDR6 memory rather than GDDR7"

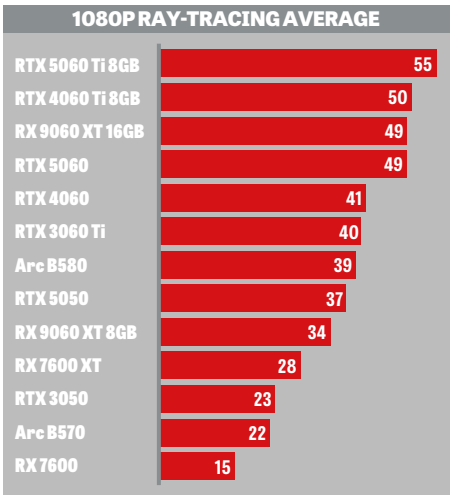
The RTX 5050 is by no means a bad card, as shown by its 1080p averages. If you end up with one in a prebuilt system, and that's reflected in the price, there are reasons to be cheerful. Upgraders, though, should avoid the RTX 5050 for the simple reason that the RTX 5060 offers so much more for another £50. **JEFFREY KAMPMAN**

SPECIFICATIONS

PCIe Gen 5 x8 graphics card • 2,572MHz boost clock • 8GB GDDR7 memory • 128-bit memory interface width • 320GB/sec memory bandwidth • 20 streaming multiprocessors • 2,560 GPU shaders • 80 tensor/AI cores • 20 ray tracing cores • 32 render output units • 80 texture mapping units • 130W TDP







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Philips Brilliance 27E3U7903/00

A 5K resolution and Thunderbolt connectivity lift this 27in monitor to Apple-rivalling heights for less cash

SCORE ★★★★½

PRICE £727 (£827 inc VAT)
from uk.insight.com

PC PRO RECOMMENDED

Apple may be most famous for trailblazing new categories such as smartphones, tablets and smartwatches, but it also has a lucrative sideline in 5K 27in monitors. Lucrative for itself – the Studio Display (*see issue 332, p62*) costs a cool £1,499 – but also for the growing number of monitor makers who undercut it for price while matching it for specs.

Philips is the latest, stuffing every known luxury and feature into the Brilliance 27E3U7903/00. Let's start with the 27in IPS panel with its 5,120 x 2,880 resolution. That translates into 218 pixels per inch, compared to 81ppi for a Full HD (1,920 x 1,080) panel, 109ppi for a 1440p display and 163ppi for a 4K 27in monitor. I will shake the hand of anyone who can instantly spot the difference between 163ppi and 218ppi on a screen from normal viewing distances, but here you'll enjoy crystal-sharp images even if you press your nose close to the glass.

Exactly like the Apple Studio, this panel peaks at a claimed 600cd/m² – 623cd/m² in our tests – and covers almost 100% of the DCI-P3 and Display P3 gamut. Likewise Adobe RGB, which is great news for print designers, and Philips provides presets for all three of those colour spaces along with sRGB. Even greater news for those who demand long-term accuracy is that this monitor is Calman Ready, which means you don't need to be an expert to recalibrate the panel (colours drift over time); you simply need to connect a supported calibrator and use Calman software. Calman Home for Philips costs $199, for example, but sometimes the software comes bundled with the calibrator.

The screen's colour accuracy was up to the high standards you should expect at this price, with only one relatively weak area in our tests: Philips claims a 2,000:1 contrast ratio but it never reached above 1,500:1 in our tests. Philips could also have worked harder on diffusing reflections on this glossy screen, but that might have reduced the impact of blacks. And note the DisplayHDR 600 certification, which promises stronger contrast when viewing HDR content. Philips packs in a loud set of speakers too, which I would describe as decent rather than spectacular. I hoped for more bass at this price.

The features don't stop there, with a 1440p camera built into a module at the top of the display. There's plenty of detail, but its colours don't compare to a good-quality standalone webcam. Also make sure that you push the microphone's sensitivity up, as I found it quiet by default. More positively, there's a physical privacy cover and support for Windows Hello.

Choose Apple and you have to pay an extra £300 for a height-adjustable stand, but Philips provides one as standard. It's far less stylish than that of the Studio Display – so is the Brilliance 27E3U7903 itself – but it does the job, with 150mm of height adjustment, support for portrait mode and 180 degrees of rotation left or right. This makes it easy to access the rear of the monitor, where you'll find a mere two video inputs: one for HDMI 2.1, another for Thunderbolt 4. However, there's another Thunderbolt 4 port for daisy-chaining a second monitor, along with a USB hub that features two USB-A ports and two USB-C ports (one for upstream connections, one downstream). There's also an RJ45 port, so this is a truly modern docking monitor. Another plus point is that the power supply is integrated, slotting neatly into the rear of the panel, while 96W of power delivery over Thunderbolt 4 will be enough for all but the most powerful of laptops.

ABOVE The 5K resolution provides a crystal-clear 218 pixels per inch

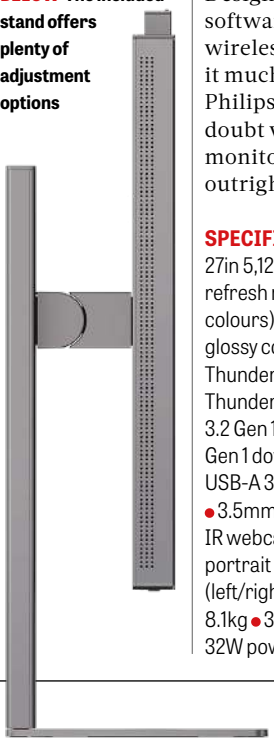
LEFT Ports include Thunderbolt 4 and an RJ45 connector

Considering everything you're getting, it's hard to argue with the price. And I'm not just comparing it with Apple here: I recently tested two other 5K 27in displays, the BenQ DesignVue PD2730S (*see issue 372, p89*) and ViewSonic ColorPro VP2788-5K (*see issue 372, p86*), and they cost £1,000 and £1,199 respectively.

"Considering everything you're getting, it's hard to argue with the price. And I'm not just comparing it with Apple"

The Philips even wins for features; neither of its rivals includes a webcam, for instance, while the BenQ doesn't include an RJ45 port. If I was spending this much then I would still lean towards the DesignVue for its bundled calibration software, its aesthetics and the wireless Hotkey Puck G3 – this makes it much easier to change settings than Philips' basic OSD – but there's no doubt which of the four 5K 27in monitors we've tested wins for outright value. **TIM DANTON**

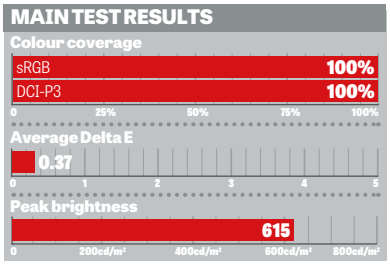
BELOW The included stand offers plenty of adjustment options



SPECIFICATIONS

27in 5,120 x 2,880 IPS panel • up to 70Hz refresh rate • 8-bit + FRC panel (1.07 billion colours) • 4ms grey-to-grey response time • glossy coating (7H) • DisplayHDR 600 • Thunderbolt 4 upstream (96W) • HDMI 2.1 • Thunderbolt 3.2 downstream (15W) • USB-C 3.2 Gen 1 upstream (data only, 15W) • USB 3.2 Gen 1 downstream (data only, 15W) • 2 x USB-A 3.2 Gen 2 • USB-B 3.2 Gen 2 • 1GbE LAN • 3.5mm combo jack • 2 x 5W speakers • 5MP IR webcam • 150mm height adjustment • portrait mode • -5° to 20° tilt • 180° swivel (left/right) • 624 x 176 x 416-566mm (WDH) • 8.1kg • 3yr advanced exchange warranty • 32W power at 200cd/m²

MAIN TEST RESULTS



Default settings

palicomp

01270 898 104
sales@palicomp.co.uk

pro-series

mid [PRO1]

£449.99

CPU	AMD RYZEN 5 8500G
Core	6 Cores - 12 Threads
Clock	(3.5/5Ghz Turbo)
Mob	ASUS TUF A620M-PLUS WIFI
RAM	ADATA 16GB DDR5 5600Mhz
M.2	TRANSCEND 1TB M.2 nVME
GPU	AMD RADEON Graphics
Case	KOLINK Observatory HF MESH
O/S	*NO OPERATING SYSTEM*
PSU	BUILDER 500W PSU

Max [PRO2]

£979.99

CPU	AMD RYZEN 5 7600X
Core	6 Cores - 12 Threads
Clock	(4.7/5.3Ghz Turbo)
Mob	ASUS PRIME B650M-A WIFI II
RAM	ADATA 32GB DDR5 5600Mhz
M.2	TRANSCEND 1TB M.2 nVME
GPU	NVIDIA RTX4060 TI 16GB
Case	1stPlayer D3-A aRGB - Black
O/S	*NO OPERATING SYSTEM*
PSU	CIT 700W PSU

UBER [PRO3]

£1159.99

CPU	INTEL Core i5 14600K
Core	14 Cores - 20 Threads
Clock	(2.6/5.3Ghz Turbo)
Mob	ASUS B760M-K
RAM	ADATA 32GB DDR5 5600Mhz
M.2	ADATA 2TB S70 Blade M.2 nVME
GPU	NVIDIA RTX4060 TI 16GB
Case	GAMEMAX F15M MESH
O/S	*NO OPERATING SYSTEM*
PSU	BEQUIET 850W Gold PSU

Aurora RANGE

i3 Aurora [AUR1]

£629.99

CPU	INTEL Core i3 14100F
Core	4 Cores - 8 Threads
Clock	(3.5/4.7GHz)
Mob	ASUS B760M-K
RAM	ADATA 16GB DDR5 5600Mhz
M.2	TRANSCEND 1TB M.2 nVME
GPU	NVIDIA RTX3050 8GB
Case	GAMEMAX Abyss Mini RGB
O/S	MICROSOFT Windows 10/11
PSU	CIT 600W Bronze PSU

i5 Aurora [AUR2]

£999.99

CPU	INTEL i5 14400F
Core	10 Cores - 16 Threads
Clock	(Turbo 4.7Ghz)
Mob	ASUS B760M-K
RAM	CORSAIR 32GB DDR5 6000Mhz
M.2	ADATA 2TB M.2 NVMe
GPU	NVIDIA RTX4060 8GB
Case	CORSAIR iCUE 4000X
O/S	MICROSOFT Windows 10/11
PSU	CORSAIR 650W PSU

i7 Aurora [AUR3]

£1599.99

CPU	INTEL Core i7 14700KF
Core	20 Cores - 28 Threads
Clock	(3.4/5.6Ghz Turbo)
Mob	ASUS PRIME Z790-P WIFI - DDR5
RAM	CORSAIR 32GB DDR5 6000Mhz
M.2	ADATA 1TB S70 Blade M.2 nVME
GPU	NVIDIA RTX4070 12GB
Case	CORSAIR iCUE 4000X RGB
O/S	MICROSOFT Windows 10/11
PSU	CORSAIR 650W Gold PSU

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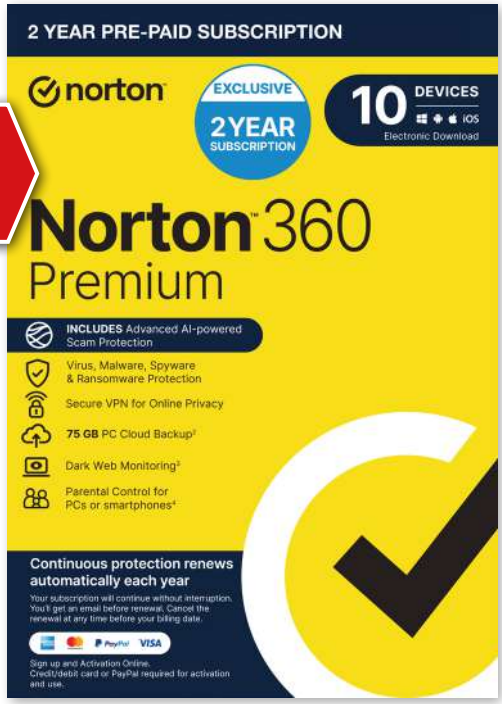
Bag a software bargain

Don't pay full price for software when we can offer you huge reductions on genuine products

NORTON 360 PREMIUM for £19.99

SAVE 89%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Parental Control for PCs or smartphones
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Your subscription will continue without interruption. You'll get an email before renewal. Cancel the renewal at any time before your billing date.
VISA
Sign up and Activation Online. Credit/debit card or PayPal required for activation and use.

10 DEVICES | **2YR LICENCE** | **75GB CLOUD STORAGE**

tinyurl.com/norton360premium

We've negotiated this exclusive deal for *PC Pro* readers. No subscriptions, just a one-off bargain price of £19.99 compared to the regular £179.99 charge. That buys you two years of cover from the powerful Norton Security suite across ten devices, and there's no danger of being hit with hiked renewal fees.

Because it's the Premium version, you get a host of extra tools. Top of the list is the full version of Norton VPN, both to protect your identity and provide a way of watching British TV while you're abroad.

There's also 75GB of cloud storage for secure backups, while Norton's Dark Web Monitoring service will alert you if private details – such as your email address and passwords – have been compromised online.

Norton Parental Control provides tools to see exactly what your kids are up to on their various devices, allowing you to set browsing times and restrictions, and you also get GPS location monitoring for Android and iOS.

To round things off, Norton Password Manager generates and stores passwords across all your devices. All this for £19.99? Did someone say bargain?

WINDOWS 11 PRO UPGRADE for £49.99

SAVE 58%

1 PC | **PERPETUAL LICENCE**

tinyurl.com/win11pro-upgrade

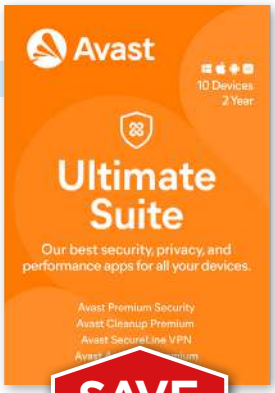
Want to upgrade from Windows 11 Home to Windows 11 Pro? Or perhaps you're looking to move up from Windows 10 Home?

Whatever your motives, a Windows 11 Pro upgrade licence is a great choice. Microsoft charges £119.99 for a retail licence of Windows 11 Home, £219.99 for Windows 11 Pro, and £119.99 for its own upgrade licence from 11 Home to Pro.

Unlike Windows 11 Home, Windows 11 Pro enables you to connect to a business domain. It also provides BitLocker to encrypt whole drives. Best of all, you can create and host virtual machines using Hyper-V, which is ideal for testing new software or, if you're a developer, seeing how your software performs on a fresh OS.

Note that the upgrade only works from an activated copy of Windows 11 Home, so if you're using Windows 10 Home then you'll need to upgrade to Windows 11 first. Want to upgrade from Windows 7 or 8? Or building a PC from scratch? Head to **tinyurl.com/windowspro11** and grab a full 1-PC licence for Windows 11 Pro for only £79.99.

AVAST ULTIMATE SUITE 2025 for £29.99



SAVE 85%

10 DEVICES | **2YR LICENCE**

pcpro.link/avast

We've secured an 85% discount on the security suite that swooped to victory in this month's Labs (see p78). £29.99 buys you protection, a VPN and a range of handy tools for two years across ten devices. That includes PCs, Android devices, iPhones and Macs.

Along with a powerful antivirus engine, Avast can help you spot ransomware and stop hackers from remotely taking over your device. You also receive Avast SecureLine VPN, adding an additional layer of protection. It costs £45 per year all on its own. The 2025 edition also includes AntiTrack Premium to block trackers as you surf the web, plus Avast Cleanup, a one-stop system maintenance toolkit.

Android and iOS users benefit from core antivirus and browsing protection, and a stack of anti-theft features that let you remotely locate, lock or wipe your device, use the camera to take a shot of the thief, or have the device automatically lock if the SIM is replaced.

The £29.99 cost includes a two-year subscription for ten devices, compared to £194.99 if you bought the products individually.

Google Pixel Watch 4

Class-leading battery life, a big, bright screen – and Gemini AI – make this the best Android smartwatch

SCORE ★★★★★

PRICE From £291 (£349 inc VAT)
from store.google.com

Like the Pixel Watch 3 (*see issue 362, p61*), the Pixel Watch 4 comes in 41mm and 45mm sizes, each available with or without cellular connectivity. It looks almost identical to its predecessor, but offers 10% more screen space thanks to a slimmer bezel. The domed display is easy to read at any angle, with a peak brightness of 3,000cd/m². That's 50% brighter than both the Watch 3 and the Apple Watch Series 11 (*see p72*).

The familiar crown and button remain on the side of the device, but there are now two metal contacts on the other side that work with the new upright charger. This lets you use your watch as a mini alarm clock while it's charging, but it means you can't use a charger from an older model.

Another change is that the Pixel Watch 4 is the first Google watch with a replaceable battery and display. You can't swap these out yourself – it has to be done by a certified technician – but it still makes this one of the most sustainable wearables around. This doesn't affect water resistance: the watch is rated for submersion at depths of up to 50 metres, and when I experimentally dunked my review unit in 30cm of water for half an hour, it suffered no harm at all.

Functionally, the biggest new feature in the Pixel Watch 4 is the ability to wake the Gemini AI assistant by simply raising your wrist – meaning you never need to say "hey, Google" again. I was impressed by how responsive this is, and if you accidentally activate Gemini with an unintended gesture it silently disengages after a few seconds.

Gemini is a fantastic asset to have on your wrist. Unlike Apple's Siri, it can answer super-specific questions on any topic under the sun, and suggest smart, contextual replies to messages. For example, if someone texts you "Are you still coming to dinner?", Gemini can check your calendar and location and come up with an automatic reply such as "I'm running ten minutes late". It can also retroactively identify workouts. So, if you forget to start tracking a run, the watch will send you a notification after you've finished, saying something to the effect of, "It looks like you went for a run. Do you want me to save this as a workout?"

The Google Pixel Watch 4 makes a highly accurate fitness tracker. An updated GPS antenna with two bands instead of one promises better location accuracy, and I found its automated pace and distance reports were very close to my own manual measurements.

ABOVE Gemini AI makes the Watch 4 feel like the fulfilment of the smartwatch promise

PC PRO RECOMMENDED

For tracking other health aspects, the Pixel Watch 4 offers the same tools as its predecessor: the only hardware change here is an upgraded skin temperature sensor, which Google says should make sleep stage tracking more accurate. Sleep reports are comprehensive, giving you a daily sleep score out of 100, plus metrics for time spent asleep, time spent in REM versus light and deep sleep, oxygen variation tracking and sleeping heart rate.

The Pixel Watch 4 also maintains the ability to detect loss of pulse, and to trigger an alert if it suspects you've been in a fall or a car crash. In the US the cellular version can send emergency messaging via satellite, if you don't have a mobile signal – but for now that's not available in the UK.

One last update is extended battery life. Google claims the 45mm Pixel Watch 4 will run for 40 hours in standard mode, or 72 hours per charge in low-power mode; the smaller model is rated for 30 hours and 48 hours respectively. Based on my testing, these estimates seem conservative: I found the larger Pixel Watch 4 lasted around 60 hours per charge in standard mode, allowing me to charge it every third day. That's brilliant for a watch with a fully functional AI assistant. Recharging is quick, too. If you just need a top up then 15 minutes on the charger gets you roughly 50% charge, while a full charge to 100% took me just over 45 minutes.

Whether you're looking at display quality, fitness features or endurance, the Google Pixel Watch 4 compares favourably to other smartwatches. My favourite feature, though, is something no other wearable can match: the excellent Gemini AI assistant, along with the impressively reliable wrist-raise gesture that invokes it. Together, these innovations make it effortless to access information and perform a huge range of tasks in a natural, intuitive way that feels like the true fulfilment of the smartwatch promise. **DAN BRACAGLIA**

"Gemini is a fantastic asset to have on your wrist. Unlike Siri, it can answer super-specific questions on any topic under the sun"

SPECIFICATIONS

4-core Qualcomm Snapdragon W5 Gen 2 processor • 1.2in 408 x 408/1.4in 456 x 456 OLED touchscreen (up to 3,000cd/m²) • 32GB storage • dual-band Wi-Fi 6 • Bluetooth 6 • optional 5G • GPS • UWB • NFC • eSIM • single mic • single speaker • body temperature sensor • blood-oxygen sensor • ECG sensor • electrical and optical heart-rate sensor (gen 3) • altimeter • compass • gyroscope • water resistance to 5 ATM • IP68 • 325mAh/455mAh battery • Wear OS 6 • 41 x 12.3 x 41mm/45 x 12.3 x 45mm (WDH) • 31g/37g • 1yr RTB warranty

LEFT The display is slightly larger and far brighter than the previous model

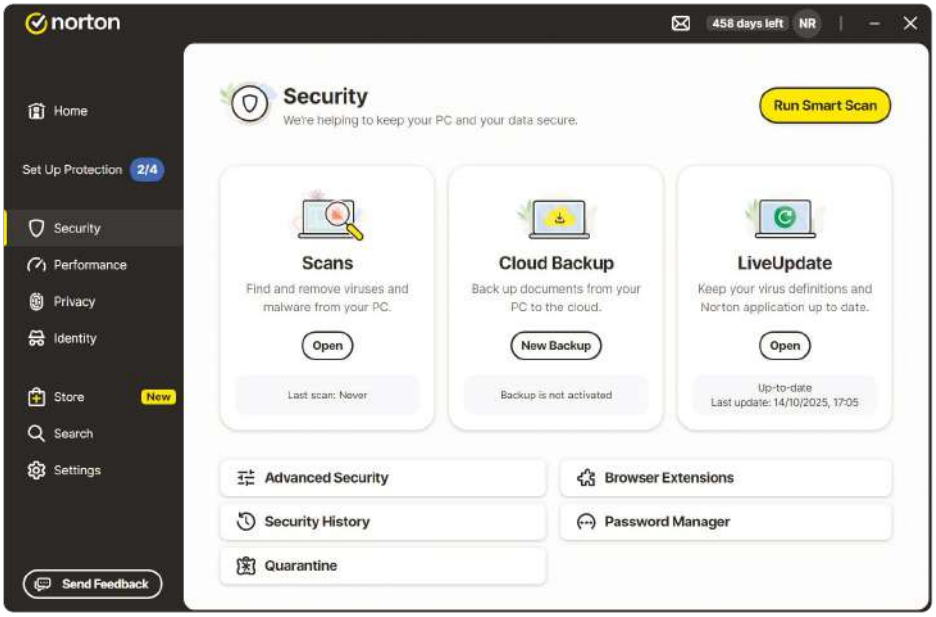
Your bonus software

Total value this month £145

We scour the globe to negotiate the best software deals for our readers, from extended licences to full programs you don't need to pay a penny for. Here's this month's lineup

Norton AntiVirus Plus 2025

- **One-PC, 15-month licence worth £40**
- **norton.com REQUIRES Windows 7 or later; 75MB hard drive space; online registration**



Norton AntiVirus Plus 2025 offers everything you need to stay safe from online threats, with on-demand and real-time scanning, behavioural monitoring, browser protection and more. This latest version also includes Genie Scam Protection, an AI-powered scam detection system that helps protect you from text and web scams, whenever and wherever you come across them.

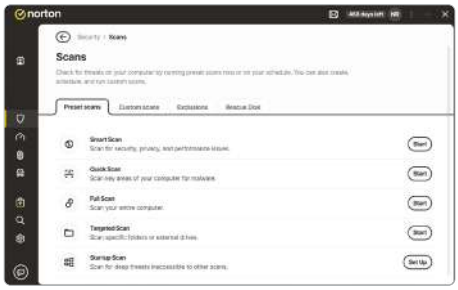
Setup is a breeze: just download the installer from the web and step through the simple, short wizard. You can put off initialising the password manager and cloud storage if you want to jump straight to scanning your drives, and return to them when you have more time.

Among other upgrades, AntiVirus Plus 2025 brings an update to the Norton Identity Safe password manager, with drag-and-drop support, and the ability to search for logins directly from the toolbar. And as well as offering tools to generate, store and manage your passwords, it can take care of credit card information and other credentials.

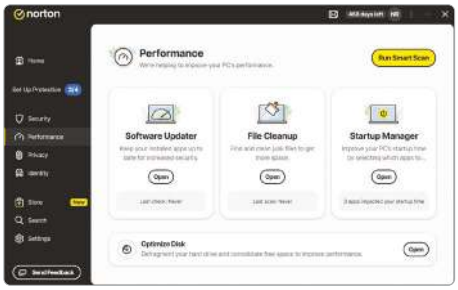
The core of the program looks much like the previous edition, with a clear, straightforward interface. Key options are just a click or two away, but there are plenty of advanced settings and tools to optimise your PC's startup time, clear away junk from your hard drive and make sure your installed software is up to date.

Core protection is more effective than ever, thanks to improvements to the behavioural protection engine, while enhanced repair capabilities use online resources to do a more reliable job of cleaning up after an infection. Real-time threat protection keeps you safe in the face of existing and emerging online threats, while the smart firewall for PC also monitor communications to help block unauthorised traffic.

As a bonus, you also get 2GB of online cloud storage for backing up your most essential files. Note that Norton requires every user to sign up to an automatic renewal, which involves payment authorisation – but once you're set up you can cancel this whenever you choose.



ABOVE Norton AntiVirus is preconfigured with several different scan types, and you can choose which sort you want to run

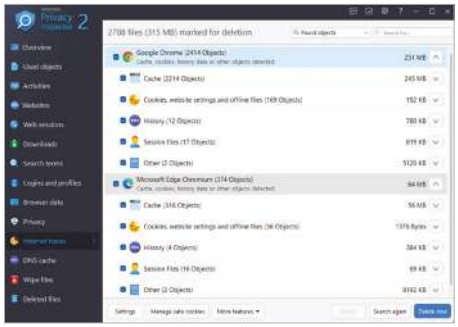


ABOVE The suite also contains tools for updating software, cleaning up on-disk junk and making your PC boot faster

ABOVE As well as virus protection, Norton AntiVirus includes 2GB of cloud storage for securely backing up your Documents folder

Ashampoo Privacy Inspector 2

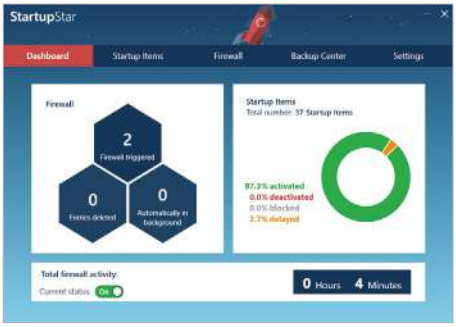
- Discover which of your activities are being logged – and safely delete confidential usage information
- Delete what other cleaners leave behind, and disable telemetry and unwanted data sharing
- Limit usage rights for apps and block location tracking, data syncing and personalised ads



Full product worth £35 ashampoo.com
REQUIRES Windows 10 or later; 100MB drive space; in-application registration

Abelssoft StartupStar 2025

- All the tools you need to get your PC's startup process under control – and keep it that way
- Review your current setup and remove any processes you no longer need
- Background Startup Firewall warns you when a new program is configured to run at startup



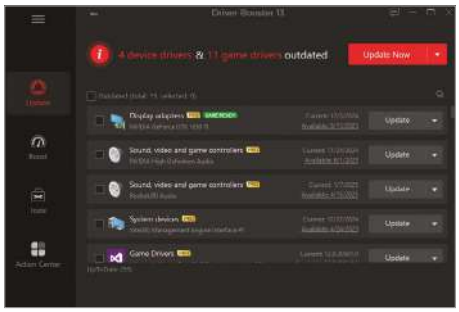
Full product worth £20 abelssoft.com
REQUIRES Windows 7 or later; 50MB drive space; in-application registration

Audials Music 2025.3 SE

SE version worth £20 audials.com
REQUIRES Windows 8 or later; 250MB drive space; in-app registration

- Find music tracks online to stream or download
- Search by audio track or music video, then add songs to your collection for playing back later
- Up to seven minutes of video enhancement and allows batch processing of up to three audio files

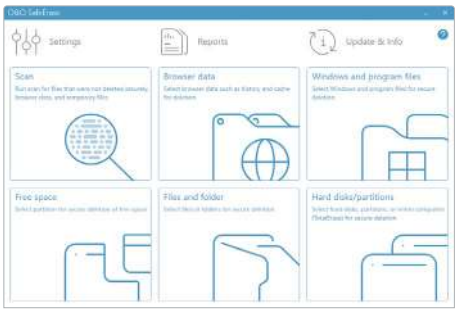
IObit Driver Booster 13 Pro



Six months of updates licence worth £10
iobit.com REQUIRES Windows 7 or later; 50MB drive space; online registration

- Scan your system for outdated drivers, download updates and install with a single click
- No complex interface or manual searching – just refer to Driver Booster's detailed report
- Silent option to update all drivers at once

O&O SafeErase 18 Professional



Full product worth £20 oo-software.com
REQUIRES Windows 8 or later; 300MB drive space; online registration

- Make sure data you want to delete is removed from your drive, beyond the point of recovery
- Securely erase files by overwriting them with zeros – or more thorough destruction methods
- Wipe internet browsing traces and system logs

How to claim your bonus software

1 Visit **pcprodownload.co.uk.** First, enter the issue number (375 this month). Next, enter your email address and the coupon code printed on the cover's spine (or directly on the front cover of digital issues of the magazine). We'll then send an email to confirm that your code has been registered. Follow the instructions in the email to access the download area.

2 Once you're in the download area, you can access this month's bonus software by navigating to the relevant product page and clicking the red Install button. For trial software, freeware and other downloads, click the Install button below the product description, or follow the onscreen instructions (please make sure to read these carefully).

3 If the software needs registering, click the purple Register button, or follow the instructions on the left of the product page (again, please read these carefully). In some cases, you may need to register for a *PC Pro* software store account – if you don't already have one – and you might be prompted to reenter the coupon code on the spine or cover.

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Remember to claim your software by 31 December 2025*

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*Codes are sometimes limited, so please claim early to avoid disappointment

Apple iPhone Air

A stunningly thin design, impactful display and the latest A19 Pro chip, but there are inevitable sacrifices

SCORE ★★★★☆

PRICE 256GB, £833 (£999 inc VAT)

from apple.com/uk

The is the boldest new iPhone design in years. It replaces the iPhone 16 Plus in Apple's lineup – but rather than going big, this model goes thin, with a claimed thickness of only 5.6mm. It's a striking innovation, and one that comes with compromises, but depending on your priorities it could be your perfect iPhone.

Slimmer by design

Clearly, the point of the iPhone Air is its thinness, but when Apple says it's 5.6mm thick, it somehow omits to mention the camera bump (which also contains many of the core components). This gives the phone a maximum thickness of 11.3mm – thicker than a regular iPhone 17 – but because it's all up at the top of the body, the phone still feels thin in the hand and even slips nicely into a shirt pocket. What's more, because the bump (Apple calls it the "plateau") runs all the way across the body, the phone doesn't wobble on a table when you set it down.

The Air comes in Sky Blue, Cloud White, Light Gold and Black; in my view the Black finish makes the design look cheap, but the Sky Blue nicely shows off the Air's thin profile. You might worry about the durability of a phone this thin, but I've seen a demo in which the iPhone Air happily survived a bend with 60kg of force. The screen is protected by a Ceramic Shield 2 display, while the Ceramic Shield back is purportedly four times more crack-resistant than glass.

The display measures 6.5in across the diagonal, with slim bezels that make for a pocket-friendly size. It's a good screen, too, with an OLED panel for rich colours and contrast, a dynamic refresh rate that scales from 1-120Hz and a rated maximum brightness of 3,000cd/m². Partnered with Apple's own anti-reflective coating, that makes the iPhone Air great to watch outdoors.

I should note that, like other iPhones, the Air doesn't cover the full DCI-P3 colour space, and doesn't quite match the best Android phones for colour accuracy. If you're watching movies rather than making them, though, you'll have zero complaints. Perhaps a bigger issue is the single integrated speaker; it's loud, but sounds tinny compared to the dual-speaker arrays found on the iPhone 17 and 17 Pro (*see overleaf*).

Straight shooter

To achieve the iPhone Air's extraordinary design, Apple cut the camera hardware down to a single 48MP sensor with 2x optical zoom. That's it; there's no separate telephoto or wide-angle lens.

For what it does, though, the main camera is impressive. Putting it head to head with the Galaxy S25 Edge (*see issue 371, p75*) – its closest rival in the thinness stakes – I found the Air delivered more realistic colours and a sharper image. In low light the Air again did a better job of capturing detail than the S25 Edge, whose shots looked a blurry mess in comparison. The 2x zoom does let you get closer to your subjects, although you can clearly see the smudging that's characteristic of digital zoom when you push to the maximum 10x magnification.

"It's a striking innovation, and one that comes with certain compromises, but depending on your priorities it could be your perfect iPhone"

RIGHT You can extend the Air's battery life by snapping a MagSafe power pack to the back

Video is also limited: the iPhone Air can't match the 120fps 4K capture of the iPhone 17 Pro, although most people will be happy with 60fps. And you miss out on fun features such as Cinematic Mode for recording videos with shallow depth of field. The Air doesn't support spatial video recording either, but that's only relevant for the Apple Vision Pro and other AR headsets.

On the plus side, you do get Dual Capture mode, which records using the front and back cameras at the same time. The iPhone Air has the same square 18MP front sensor as found on the Apple iPhone 17, 17 Pro and

17 Pro Max, so you can shoot in landscape mode in both directions at once, or conveniently capture selfies in widescreen.

A kick inside

The iPhone Air uses the same powerful A19 Pro chip as the iPhone 17 Pro and Pro Max, and the Geekbench 6 benchmark – see the graphs to the right – shows that its CPU performance is very close to those market-leading devices.

However, the GPU is limited to five cores rather than the six used in the Pro handsets, and that makes this phone less of a gaming powerhouse than its siblings. While I enjoyed smooth performance when playing *Destiny: Rising*, the Air fell behind in the demanding 3DMark Solar Bay Unlimited graphics benchmark and in the 3DMark Wild Life Extreme Stress Test. On the plus side, I found it didn't get as hot as the iPhone 17 Pro Max, making it feel not only slim in the hand, but comfortably cool.

Aside from performance, you might wonder about the iPhone Air's battery life, given the lack of space for a chunky battery. In our standard web-surfing test – loading a series of pages over 5G at a standard brightness of 150cd/m² – it lasted a decent 12hrs 2mins, which is only 45 minutes less than the regular iPhone 17. However, both phones fell far short of the iPhone 17 Pro Max, which ran for almost six hours more.

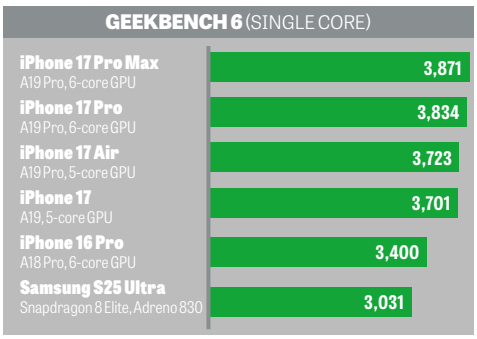
To extend the Air's battery life, Apple sells a £99 MagSafe power pack that snaps onto the back of the phone. I found this made a big difference, allowing the Air to carry on surfing for 17hrs 15mins. You wouldn't want to use this every day, though, as it defeats the purpose of buying such a thin and light phone.

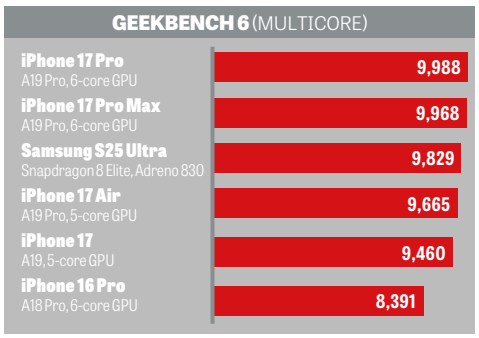
The iPhone Air also doesn't get the fast 40W charging that the iPhone 17 and iPhone 17 Pro series enjoy; 30 minutes took the battery to 55%, which is okay rather than great.

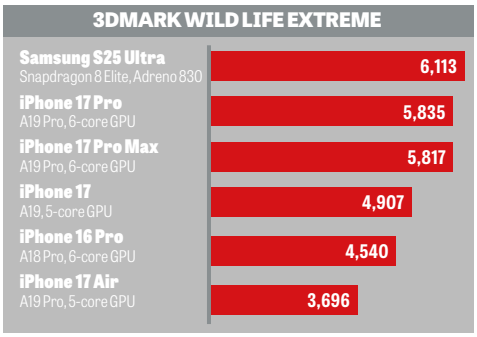
Latest intelligence

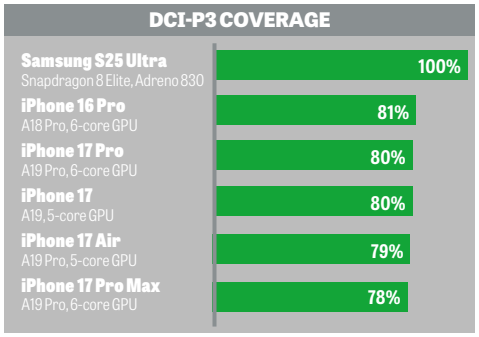
Like all the latest iPhones, the Air comes with iOS 26 pre-installed. This brings the new Liquid Glass design, which adds slick-looking transparency effects to various apps, and I also like how you can better customise your lock and home screens with 3D-like spatial photos.

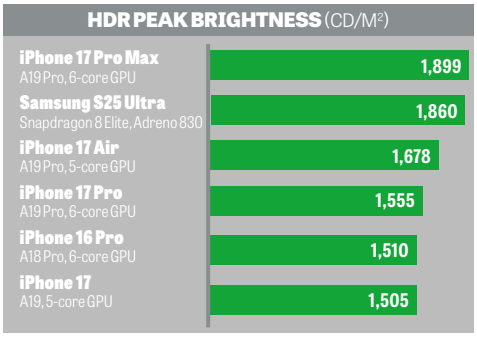
Major feature upgrades come to the Phone app in particular. There's Hold Assist, which will let you know when a human finally comes online in call queues, while Call Screening helps keep scammers away. I also appreciate the ability to add backgrounds to Messages, and create polls.

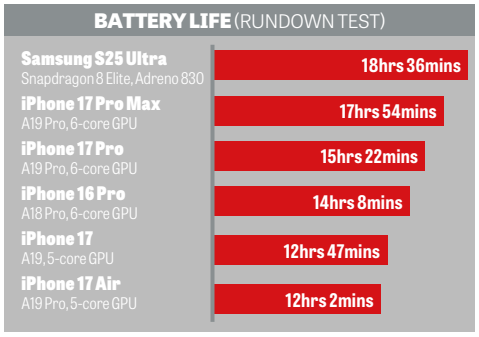












Apple Intelligence is still hard to get excited about – we're all waiting for the smarter Siri that's promised for next year. There are a few noteworthy AI upgrades, such as looking up the contents of a screenshot via Google, or asking questions about it via ChatGPT. But it feels clunky next to Google's Gemini Live, which accesses your screen directly, with no need to take a screenshot.

Air apparent?

The iPhone Air is a remarkable piece of engineering. Despite the lump, the overall impression is amazingly thin and light, and Apple deserves particular credit for making it so durable. It feels so strong I wouldn't bother with a case. While it's not the fastest phone around, performance is fine for everyday tasks, and the phone remains cool under pressure.

However, I don't like the fact that the slim design means you have to give up both the ultrawide lens and the dedicated zoom, and it's disappointing to miss out on Cinematic Mode video and fast charging, too. The iPhone 17 Pro costs only £100 more and gets the full feature set, along with boosted graphical performance.

"The iPhone Air is a remarkable piece of engineering, and Apple deserves particular credit for making it so durable"

RIGHT The searingly bright OLED panel is ideal for use in the midday sun

So the decision boils down to how much you care about having a (largely) super-thin phone. In terms of style and svelteness there's nothing out there to rival the iPhone Air, but you'll have to live with the trade-offs if you want something this compact: it's an iPhone Light in more ways than one. **MARK SPOONAUER**

SPECIFICATIONS

6-core Apple A19 SoC • 12GB RAM • 5-core Apple GPU • 6.5in 120Hz AMOLED screen, 1,260 x 2,736 resolution • 5G • 256GB/512GB/1TB storage • eSIM • IP68 • 48MP rear camera • 18MP front camera • Wi-Fi 7 • Bluetooth 6 • NFC • 3,149mAh battery • USB-C 2 connector • iOS 26 • 75 x 5.6 x 156mm (WDH) • 165g • 1yr warranty

Apple iPhone 17

Better value than last year thanks to a heap of upgrades to the screen, storage offering and performance

SCORE ★★★★★

PRICE 256GB, £666 (£799 inc VAT)
from apple.com/uk

PC PRO RECOMMENDED

While the iPhone Air on the previous pages is the eye-catching new arrival, the entry-level iPhone hasn't been neglected – in fact, it's quietly received its biggest upgrade in years.

For a start, the base model now comes with 256GB of storage, twice as much as the iPhone 16 (*see issue 363, p68*), for the same price. The display is larger, too, while the front and back benefit from a sturdier Ceramic Shield coating that's supposedly three times as scratch-resistant as the old one. It still feels the same in the hand, neither noticeably larger nor heavier, although I'm not a fan of this year's subdued colour options, which look rather apologetic next to the richer, bolder tones of the iPhone 16.

Apple achieves the larger screen by making the bezels skinnier, resulting in something close to a true edge-to-edge display. It looks fantastic, with rich colours and, finally, a 120Hz refresh rate. Brightness has improved, too: I measured a peak of 1,505cd/m², up from 1,348cd/m². Coupled with improved anti-reflective coating, this makes the iPhone 17 a joy to use even in bright sunlight.

LEFT The wide-angle camera has been boosted to 48MP to match the main lens

The back of the iPhone 17 features Apple's familiar dual-camera arrangement, but the wide-angle camera has been boosted to 48 megapixels, matching the main module, for more detail and better macro performance. The front camera gets an upgrade, too, with an 18MP resolution and a wider field of view. A square sensor lets you choose portrait or landscape framing regardless of which way round you're holding the phone, or the phone can automatically adjust the framing to suit the scene.

The results look a lot like pictures shot on the iPhone 16, with crisp details and bold, bright colours. Low-light performance is a particular strength, with excellent detail even in the darkest areas. As ever, though, there's no telephoto lens, only a 2x "zoom" on the main camera that works by cropping the image and reducing the overall resolution. This is limiting when the Google Pixel 10 (*see issue 374, p72*) gives you 5x optical magnification for the same price.

Video capture goes up to 4K resolution at 60fps, with the new Dual Capture mode enabling you to record video with both the front and rear cameras at once, so you can share a scene and comment on it simultaneously. This is nice but overdue, as the best Android phones have long offered this feature.

ABOVE Improvements in every area but no price hike make the iPhone 17 a great buy

Inside, the iPhone 17 uses Apple's new A19 chip. It feels slicker and more fluid in use than the iPhone 16, but that has more to do with the boosted refresh rate than the processor. Benchmark tests show a moderate performance improvement, with Geekbench 6 single- and multicore scores of 3,701 and 9,460 respectively. GPU performance benefits more: in 3DMark's Wild Life Extreme test, the iPhone 17 averaged 4,907 (29fps), notably up from the iPhone 16's 4,067 (24fps).

Apple makes big claims for the iPhone 17's battery, promising more than eight extra hours of video playback compared to the previous model. We saw an improvement in our lab tests but not such a drastic one – the iPhone 17 lasted 34 minutes longer than the iPhone 16, achieving 12hrs 47mins of continual use. In practice I'm getting all-day battery life, but demanding users may need to top up before bedtime.

Happily, recharging is faster than before, with a 29W wired charger taking the battery from empty to 39% in 15 minutes, and to 71% in 30 minutes. That's a big improvement over the iPhone 16, and 25W Qi 2.2 charging is now supported, too.

We cover the new features in iOS 26 in the Air review, including the slick "Liquid Glass" visual style. There's also call screening and Hold Assist to help manage calls, and Apple's live translation feature impressed me with its ability to accurately translate calls in real-time. New AI features are minor, such as adding Writing Tools and Image Playground to the Shortcuts app, which is weak compared to what's available on Android.

"With twice the storage, a better display, faster charging and enhanced cameras, it's amazing the iPhone 17 costs no more than last year's model"

With twice the storage capacity, a better display, faster charging and enhanced cameras, it's frankly amazing that the iPhone 17 costs no more than last year's model. If you want an optical zoom, market-leading performance and maximum battery life then you should consider the Pro, but the iPhone 17 is an excellent phone in its own right, and easily the best bang-per-buck deal in Apple's line-up. **JOHN VELASCO**

BELOW One minor disappointment is the more subdued colours compared to last year

SPECIFICATIONS

6-core Apple A19 SoC • 12GB RAM • 5-core Apple GPU • 6.3in 120Hz AMOLED screen, 1,206 x 2,622 resolution • 5G • 256GB/512GB storage • nano SIM • IP68 • dual 48MP/48MP rear cameras • 18MP front camera • Wi-Fi 7 • Bluetooth 6 • NFC • 3,692mAh battery • USB-C 2 connector • iOS 26 • 72 x 8.8 x 150mm (WDH) • 177g • 1yr warranty

Apple iPhone 17 Pro/Pro Max

A bold design backed up by killer performance and amazing battery life for the Pro Max in particular

SCORE ★★★★★

PRICE Pro: 256GB, £916 (£1,099 inc VAT); Pro Max: 256GB, £999 (£1,199 inc VAT)
from apple.com/uk

The iPhone 17 Pro and Pro Max showcase a new design, with the camera bump extending across the entire back of the phone. In my view, it's a smart update: the full-width bar feels more "Pro", and the aluminium unibody casing feels cooler in your hand than the old titanium edging. Enhanced Ceramic Shield coatings on the front and back provide better scratch- and crack-resistance than previous models, and Apple has introduced a bold new Cosmic Orange colour, along with Deep Blue and Silver for those who prefer a more serious look.

The OLED display is perfect for sunny days. Both phones reached almost 1,000cd/m² in our SDR tests with adaptive brightness on, with the Pro Max hitting 1,899cd/m² in HDR content, while an improved anti-reflection layer means noticeably less glare, especially in direct sunlight.

At the rear, the two phones have the usual triple-camera array, but the 5x zoom camera enjoys a boost to 48MP (matching the main and wide cameras), with a larger sensor for improved image quality. As on all of this year's iPhones, the front camera uses an 18MP square sensor that can automatically switch from portrait to landscape to suit the scene, or you can switch it yourself.

Video pros will appreciate support for ProRes RAW and Genlock, for precise syncing across multiple cameras. Personally, I'm more interested in the ability to shoot from the front and rear cameras together in "Dual Capture" mode, plus better stabilisation for the front camera, which worked remarkably well even when I filmed myself jogging up a hill.

The A19 Pro processor inside the iPhone 17 Pro and Pro Max combines six-core CPU and GPU units, with neural accelerators to speed up tasks such as generating AI images. Sure enough, I found that Image Playground generated images three to four seconds faster on the iPhone 17 Pro than on last year's model.

The new silicon sees these phones beat all-comers in the Geekbench single- and multicore benchmarks, including Samsung's Android champ, the Galaxy S25 Ultra (*see issue 367, p70*). Graphics performance is even more impressive, with the 3DMark Solar Bay Unlimited test reporting an average frame rate of 47fps for the iPhone 17 Pro. That's again ahead of the Samsung Galaxy S25 Ultra's 42fps, and a big jump from the 16 Pro's 28fps. Demanding games such as *Destiny Rising* fly along, with consistently fluid action and stunning lighting effects.

ABOVE The iPhone 17 Pro and Pro Max have seen a smart redesign

"The Pro promises up to 31 hours of video playback on a full charge, while the Pro Max pushes that to a huge 37 hours"

LEFT The camera bump now stretches across the entire width of the phone

BELOW A bold Cosmic Orange colourway joins the more sober silver and blue options

Both phones also feature a new vapour-chamber cooling system, designed to minimise performance throttling during extended gaming sessions. I tested this with the 3DMark Wild Life Extreme Stress Test, which performs 20 runs of the same demanding graphics benchmark; the result was a stability score of 68%, which is 16 points higher than the Galaxy S25 Ultra.

PC PRO RECOMMENDED

As well as top performance, Apple says its new handsets offer the longest battery life yet. The Pro promises up to 31 hours of video playback on a full charge, while the Pro Max pushes that to a huge 37 hours. Our web-surfing test confirmed a definite improvement: the iPhone 17 Pro Max lasted an epic 17hrs 54mins, well ahead of the iPhone 16 Pro Max's 14hrs 17mins. Both models also recharge more quickly than ever before, if you spring for the sold-separately 40W charger.

While the Pro and the Pro Max are both great phones, you might wonder whether they're worth the extra over the regular iPhone 17 or the iPhone Air. One reason to pay the premium is if you want the bigger screen; since the Plus variant has been discontinued this year, the Pro Max is your only choice if you want a roomy 6.9in display.

The other big reason to go Pro is the optical zoom, which delivers close-ups that you simply can't capture on any other model. I'm certain that either the iPhone 17 Pro or Pro Max will make you very happy indeed – extra-large camera bar and all. **MARK SPOONAUER**

SPECIFICATIONS

6-core Apple A19 Pro SoC • 12GB RAM • 6-core Apple GPU • 6.3in 120Hz AMOLED screen, 1,206 x 2,622 resolution/6.9in 1,320 x 2,868 • 5G • 256GB/512GB/1TB/2TB (2TB Max only) storage • nano SIM • IP68 • 48MP/48MP/48MP rear cameras • 18MP front camera • Wi-Fi 7 • Bluetooth 6 • NFC • 3,988mAh/4,832mAh battery • USB-C 3.2 Gen 2 connector • iOS 26 • 72 x 8.8 x 150mm/78 x 163 x 8.8mm. (WDH) • 206g/233g • 1yr warranty

Apple Watch Series 11

All-day battery life, 5G support and a tougher display, but at the same price as last year's model

SCORE ★★★★★

PRICE From £308 (£369 inc VAT)
from apple.com/uk

PC PRO RECOMMENDED

I'd stopped holding my breath for the Apple Watch to ever last a whole day. Eighteen hours has been the ceiling for as long as I've been wearing one; sure, low-power mode adds a little wiggle room, but it feels like a compromise. So imagine my delight when Apple revealed that the Apple Watch Series 11 delivers a full 24 hours of battery life.

And it's no empty promise. Even with the always-on display enabled, I could wear the watch overnight and recharge at my convenience during the day. It's a revelation after having to work around an 18-hour battery.

There are a few other improvements. The cellular model has now moved from LTE to 5G, enabling a faster, smoother data connection, and the wide-angle OLED screen now features tougher glass. Apple claims this is twice as scratch-resistant as previous models, and seeing how my old Apple Watch has been scuffed from normal use, I'm glad the Series 11 promises greater durability.

I just wish Apple had taken the chance to make the display brighter. It's readable, but not as bright as the latest models from Samsung or Google, and the difference is noticeable outdoors. If you want maximum brightness in Apple's ecosystem, you need the Apple Watch Ultra 3.

Still, I can't complain too much as the Series 11 costs the same as last year's Series 10. It looks identical, too, with the same dimensions and very similar weights. The standard models come in aluminium casing and four colours: Jet Black, Rose Gold, Silver or a new Space Grey option that I gravitated towards. Alternatively, you can pay a premium for Slate, Gold or Natural titanium cases.

The accompanying watchOS 26 software brings new features of its own, although these aren't hardware-exclusive, and will also work on older Watch models. New blood-pressure alerts can detect possible hypertension, based on the optical heart-rate sensor; it's not a medical diagnosis, but it could alert you to a condition you weren't aware of.

There's also a new Sleep Score feature, which gives you a rating out of 100, with reports and advice on how long you slept, how consistent your bedtimes are and how often your rest was interrupted. Live message translations are available, too, but only when paired with an Apple Intelligence-compatible phone – the watch itself still isn't what I'd call an "AI smartwatch". More context-aware features are needed to make talking to your Apple Watch worthwhile.

Although the latest Apple Watch isn't a major update, the jump in battery life is very welcome, while 5G support and improved scratch-resistance add convenience and durability. For first-time buyers or those overdue for a refresh, the Apple Watch Series 11 offers a superb combination of design, performance and longevity. **KATE KOZUCH**

SPECIFICATIONS

Apple S10 chip • 42mm 374 x 446; 46mm 416 x 496 OLED touchscreen (up to 2,000cd/m²) • 64GB storage • dual-band Wi-Fi 4 • Bluetooth 5.3 • optional 5G • GPS • UWB 2 • NFC • eSIM • single mic • single speaker • depth gauge to 6m • water temperature sensor • body temperature sensor • blood-oxygen sensor • ECG sensor • electrical and optical heart-rate sensor (gen 3) • altimeter • compass • gyroscope • water resistance to 50m • IP6X • claimed 36hr battery life • watchOS 11 • 42 x 9.7 x 36mm/46 x 9.7 x 39mm (WDH) • 30g to 43g • 1yr RTB warranty

Apple Watch Ultra 3

Bulky and expensive, but a great choice if you want the best battery life, biggest screen and a rugged design

SCORE ★★★★★

PRICE From £624 (£749 inc VAT)
from apple.com/uk

I see the Apple Watch Ultra on a lot of wrists these days, and when I ask people why they chose it, their answers usually boil down to two things: the long battery life and the big display. Those are still great reasons to choose the Ultra, and both have become even better this year.

"The Apple Watch Ultra 3 now lasts a massive 42 hours on a charge; in low-power mode you can stretch it to 72 hours"

Thanks to what Apple calls a "re-engineered" battery, the Watch Ultra 3 lasts a massive 42 hours on a charge; in low-power mode you can stretch it to around 72 hours. This doesn't keep up with the likes of Garmin's fitness watches, but if you're coming from an older Series, the difference is night and day. Charging is faster, too, giving you about eight hours of use from 15 minutes of charge, or going from zero to 80% in 30 minutes.

LEFT The Apple Watch finally delivers all-day battery life

The screen, meanwhile, is the largest of any Apple Watch to date thanks to slimmed-down bezels. It's not a huge change – the display has expanded from 410 x 502 pixels on the Ultra 2 to 422 x 514 – but on a device this small, every bit of extra space makes a difference. It's Apple's brightest watch, too, with a peak brightness of 3,000cd/m² – 50% more than the Apple Watch Series 11, and three times as bright as the SE 3.

Otherwise, the design is pretty much the same as before, down to the orange Action Button on the side and 100m water resistance. But there is one other invisible upgrade that you might be thankful for in an emergency, and that's the ability to share your location and details via satellite when you're out of cellular range. This joins existing safety features such as fall detection and crash detection.

BELOW Big, bold and beautiful: the Ultra is the ultimate Apple Watch

It's also a fully featured health- and activity-tracker, offering all of the tools you'll find in the Series watch. This includes compatibility with Apple Fitness Plus classes, ECG readings, SpO2 reports, skin

PC PRO RECOMMENDED

temperature analysis for menstrual cycle predictions, and sleep tracking.

On the software front, the Watch Ultra 3 gains hypertension alerts and the new Sleep Score feature, although since these are built into the latest watchOS, they'll also work on older Ultra 2 models. If your phone has Apple Intelligence you can use the watch with the new "Workout Buddy" feature, which offers encouragement during workouts, puts your activity in the context of your history and tracks upcoming milestones.

There are two downsides to the Apple Watch Ultra 3. One, it remains a very bulky smartwatch to wear all day. I wish I could get the long battery life and large display in a more compact style. The other is the price: it comes in only one configuration (finished in either Natural Titanium or Black Titanium), which includes 5G support but costs more than twice as much as the regular Apple Watch.

Even so, with the biggest, brightest display, the longest-lasting battery and both cellular and satellite connectivity, this is the watch for people who want everything that Apple has to offer on their wrist. **KATE KOZUCH**

SPECIFICATIONS

Apple S10 chip • 422 x 514 OLED touchscreen (up to 3,000cd/m²) • 64GB storage • dual-band Wi-Fi 4 • Bluetooth 5.3 • optional 5G • satellite connectivity • GPS • UWB 2 • NFC • eSIM • three-mic array • dual speakers • depth gauge to 40m • water temperature sensor • body temperature sensor • blood-oxygen sensor • ECG sensor • electrical and optical heart-rate sensor (gen 3) • altimeter • compass • gyroscope • water resistance to 100m • IP6X • claimed 42hr battery life • watchOS 11 • 49 x 12 x 34mm (WDH) • 62g • 1yr RTB warranty

Apple Watch SE 3

The always-on display and 5G option mean this year's SE is less of a compromise than previous models

SCORE ★★★★☆

PRICE From £183 (£219 inc VAT) from apple.com/uk

The Apple Watch SE has always been an affordable way to get the essentials of fitness tracking and iPhone connectivity, and the SE 3 feels less like a compromise than ever, thanks to the addition of an always-on display and 5G.

The latest model benefits from almost all the software upgrades in watchOS 26, including the on-wrist Notes app, live message translations and even "Workout Buddy", the Apple Intelligence-powered fitness coach. Motion gestures and on-device Siri are supported, too: as well as protecting your privacy, that means Apple's voice assistant can do some things even when the watch is disconnected from Wi-Fi or a smartphone. And in a fun upgrade, you can now play music straight out of the SE's speaker, something previously limited to the Series line.

My favourite upgrade, though, is the always-on display – something I missed on the SE 2. For me, being able to glance at the time without having to lift my wrist every single time is a huge quality-of-life improvement. The SE 3's display only updates once a minute, compared to once a second for the Series 11 and Ultra 3, but that doesn't feel like a big problem.

On the cellular model, 5G support is another benefit. This isn't just about online performance: the new antenna supports more bands, and can intelligently merge connections to keep you online in areas of patchy coverage without draining the battery. That's a good thing, as the SE 3 doesn't benefit from the extended battery life of other models – it's still limited to 18 hours on a charge. It's also nice that the cellular upgrade costs only an extra £70, compared to the £100 extra on the Series 11.

For health and fitness tracking the SE 3 covers essentials such as step counting, automatic workout detection and custom workout creation. Its heart-rate sensor isn't as advanced as the one on the Series 11, so it won't support hypertension alerts, but a new skin-temperature sensor helps the Cycle Tracking app give more accurate ovulation reports.

ABOVE The always-on display means you can glance at your wrist to see the time

The SE 3 also brings Apple's growing suite of sleep features, including sleep apnoea detection and the Sleep Score, which provides an easy-to-understand snapshot of your nightly rest, complete with actionable insights.

If there's one area where the Apple Watch SE 3 feels like a trade-off, it's design. It looks like an Apple Watch, but an older model: the display is noticeably smaller than the Series 11's, and the 1,000cd/m² brightness doesn't hold up as well in direct sunlight. The colour choices are also limited to Starlight and Midnight, although you can of course accessorise with a wide range of bands.

Finally, I must highlight that the SE 3 doesn't have the ECG capabilities of the Series models. That would make me hesitant to pick the SE 3 for a parent or someone at higher risk, as the atrial fibrillation detection feature could be genuinely life-saving.

"The antenna supports more bands, and can intelligently merge connections to keep you online in areas of patchy coverage"

For most first-time buyers, though, the latest Apple Watch SE is a great choice, delivering an experience that's remarkably close to the Series 11 at a far lower price. **KATE KOZUCH**

SPECIFICATIONS

Apple S10 chip • 40mm 374 x 446; 45mm 416 x 496 OLED touchscreen (up to 1,000cd/m²) • 64GB storage • single-band Wi-Fi 4 • Bluetooth 5.3 • optional 5G • GPS • NFC • eSIM • single speaker • body temperature sensor • blood-oxygen sensor • optical heart-rate sensor (gen 2) • altimeter • compass • gyroscope • water resistance to 50m • claimed 18hr battery life • watchOS 11 • 40 x 10.7 x 34mm/44 x 10.7 x 38mm (WDH) • 26g to 33g • 1yr RTB warranty

Apple AirPods Pro 3

Superb sound quality and amazing noise cancellation make these the standout earphones

SCORE ★★★★★

PRICE £183 (£219 inc VAT)
from apple.com/uk

PC PRO RECOMMENDED

There are a few things I always carry with me. In my right-hand front jeans pocket goes my wallet, and both fast and slow insulin syringes. In the left goes my phone and the Apple AirPods Pro 2 case (let's shorten that to the AP2), now supplanted by the Pro 3. For the past year I've carried the AP2 with me everywhere; its small, curved case design slips easily into my pocket. They're ready for use for weeks at a time without recharging the case.

So these earphones have been my constant companions, at the ready for a phone call I want to make or to listen to music while walking. Or when I realise that the band in the local pub is uncomfortably loud, and I need some hearing protection. As an auditory Swiss-army knife, they do it all.

I've been incredibly happy with them, so the question comes: what made me buy the AirPods Pro 3? In part because Apple promises the AP3 buds have longer battery life, and that's something I look forward to trying on a long-haul flight where the AP2 set occasionally comes up short.

But the real reason I spent the cash was the promise of better noise cancellation. I thought that would be hard to achieve, given how astonishingly good the noise cancellation is on the AP2, but I was wrong: the AP3 is clearly that bit better.

The precise fit of an earbud into your outer ear is critical to making noise cancellation work at its best. That's why I was pleased to see that AP3 comes with five choices of tip size, compared to the four supplied with AP2. Spend time playing around with the various options and the fit test in the settings as the rewards will come.

BELOW The AirPods Pro 3 come with five choices of tips to ensure the perfect fit

Sound quality is excellent. There's actually a microphone that points into your ear, and it measures the acoustics of the outer ear and canal. That's because everyone's ear shape is different. It then does adaptive EQ on the fly to ensure the best response.

Subjectively, I can tell you that the AP3 sound excellent and that the noise reduction works better than the AP2. But I can back that up with real figures: measuring them on the Head and Torso Simulator (HATS) in my lab revealed superb audio performance, and exceptional noise reduction.

Considering the AP3 as a refreshed and improved AP2 alone would be enough for me. However, it's the raft of new capabilities that really impresses. AP3 now has a heart-rate monitor, which is useful for those who indulge in health routines. It's a simple optical sensor, where an LED shines into your ear canal and measures the changes in light absorption caused by blood flow. According to others who have put it through tests against standalone heart-rate monitors, it's accurate, too. And don't forget you can pair these devices with your Apple Watch, so you can leave your phone at home when you go jogging or cycling.

The hearing aid feature is well worth looking into. It performs a surprisingly high-quality and trustworthy test, even if it will only measure the basics. It assured me my hearing is not bad in a quantitative measurement compared to when I was in my 20s, but what it can't reveal is that my hearing is qualitatively vastly better thanks to 40 years of critical listening work.

ABOVE The AirPods 3 somehow manage to improve on the stellar noise cancellation of their predecessors

For those who like wearing the AirPods Pro in bed – they pair seamlessly with all your Apple devices, including Apple TV – I have more good news in the form of improved location finding. The FindMe feature now supports real-time tracking thanks to the addition of the Ultra Wideband U1 chip. It's extremely clever, but given they live in my left pocket I suspect I'll rarely call upon it.

I haven't yet mentioned live translation, which Apple made a big fuss of during its launch announcement. The first thing to say is that this is all done on your iPhone and isn't really a feature of the AirPods. However, I gave it a try translating a native French speaker who happens to live with me to English, and it works. Actually rather well. His words appeared translated into English after a second or so, and what I spoke appeared in French on the phone's Translate app.

There are still signs that this is beta, not least that you have to download the app rather than it being baked into the OS and that so few languages are supported (French, German, Portuguese and Spanish, with Mandarin, Italian, Japanese and Korean to follow this year). Nor does the feature work for EU-registered phones, because it's an OS-level capability and Apple doesn't want to be forced to make it work for every other headphone manufacturer for free. Blame the EU regulators for that if you wish.

"Sound quality is excellent. There's a microphone that points into your ear, and it measures the acoustics of the outer ear and canal"

Overall, the AirPods Pro 3 are exceptional. Are they a worthy upgrade from AirPods Pro 2? For sure; the improvements are not merely cosmetic and a version number bump, but the AP2 remains an excellent product, not least because it also supports live translation. But I can't deny that with the AP3 in my pocket, I'm even more content than before. **JON HONEYBALL**

SPECIFICATIONS

2 x Apple H2 headphone chips (one per cup) • active noise cancellation • Adaptive EQ • spatial audio with dynamic head tracking • dual beamforming mics • inward-facing mic • heart-rate sensor • Bluetooth 5.3 • up to 8 hours battery life (24hrs with case) • IP57 • MagSafe Charging Case with UltraWideband chip • 19.2 x 27 x 30.9mm each (WDH) • 5.6g each • 1yr limited warranty • requires Apple devices with latest version of OS

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Google Pixel 10 Pro Fold

Impressively vibrant displays, a durable design and strong battery life, but it's a chunky beast

SCORE ★★★★☆

PRICE 256GB, £1,458 (£1,749 inc VAT)
from store.google.com

Talk about a tough act to follow. The Pixel 10 Pro Fold arrives in the wake of the Samsung Galaxy Z Fold7 (*see issue 372, p48*), a phone so thin and light that it comprehensively raised the bar for foldable phones. Yet in my testing of Google's new foldable, I've found it beats Samsung's in several ways. It's also cheaper.

There's no hiding from the fact that the Pixel 10 Pro Fold is chunkier than the Galaxy Z Fold7, but there's a definite advantage to its design. Google's new gearless hinge provides excellent protection against water and dust intrusion, making it more rugged than rivals: it's the first foldable with an IP68 rating. The Z Fold7 only bears an IP48 rating, which means small particles of dust can get in there, and you definitely shouldn't take it to the beach.

Fine displays

The big attraction of the Pixel 10 Pro Fold is its fold-out 8in OLED display. And it looks stunning, whether you're surfing the web, streaming Netflix or running two apps side by side. The Pixel 10 Pro Fold literally outshines the Galaxy Z Fold7: in our testing its peak brightness exceeded 2,500cd/m², versus 2,000cd/m² for the Galaxy. The front 6.4in screen is brighter than the Samsung's, too: I could easily see the difference when watching the trailer for *The Mandalorian & Grogu* film outside, although the action was still clearer on the interior 8in panel.

Strictly speaking the Z Fold7 has a larger cover display, with a 6.5in diagonal, but I prefer the Pixel 10 Pro Fold because it's a wider shape that's easier to type on. I also like the light green Jade colour that my review unit came in, while the slate blue Moonstone option looks professional. Samsung's rich Blue Shadow still wins for wow factor, though.

Battery and charging

Aside from brightness, the Pixel 10 Pro Fold beats its rival in battery capacity. Google builds in a 5,015mAh battery versus the 4,400mAh unit inside the Z Fold7. While comparing amp-hours doesn't always give a true reflection of how long different phones can last between charges, in this case I saw a benefit in real-world longevity. In our web-surfing test, carried out over a 5G connection, the Pixel 10 Pro Fold lasted 12hrs 16mins, while the Z Fold7 conked out after 10hrs 44mins.

When it's time to power back up again, Google's 67W wired charger (sold separately) can take the Pixel 10 Pro Fold from empty to 58% charged in 30 minutes – slightly better than the 54% from Samsung's foldable.

The Pixel 10 Pro Fold also benefits from having magnets built right into its body, so you can snap a Qi2 wireless charger directly onto its back, while the Z Fold7 needs a separate case to add this capability.

ABOVE The Pixel 10 Pro Fold is a great foldable for those with deep- and wide-pockets

"The gearless hinge provides excellent protection against water and dust intrusion: it's the first foldable with an IP68 rating"

BELOW The impressive cameras include a 5x optical zoom lens

Camera surprise

The Pixel 10 Pro Fold's main camera has far fewer pixels than the Galaxy Z Fold7's – 48MP versus 200MP – but pixel count doesn't always translate to quality, and I generally preferred the results from Google's camera.

For example, portraits taken in the same setting came out crisper and brighter on the Pixel, although I preferred the texture of the Samsung's bokeh effect. The Pixel also did a better job in low light, picking up plenty of fine detail on Halloween decorations and achieving beautiful colour balance on a tricky shot of a pink hydrangea under yellow streetlights.

Where the Pixel 10 Pro Fold really pulls ahead is in its zoom performance. Its 5x optical zoom lens gives it a fundamental advantage over the Samsung with its 3x lens, and lets you push farther into the digital zoom range with less loss of quality. Urban shots taken on the Fold at 10x magnification were much cleaner and detailed than those taken with the Samsung.

The one area where I prefer the Samsung is for shooting video. The issue isn't the quality: the Pixel 10 Pro Fold captured very pleasing sample footage in the park at 4K and 30fps, and will even go up to 60fps. However, as I zoomed and panned around, the Pixel sometimes took a noticeable moment to

refocus, or to dial the exposure up and down as needed to keep the lighting balanced. The Samsung does a better job of adjusting the settings dynamically as you shoot.

Powerful AI

The Pixel 10 Pro Fold has so many AI features that frankly I think it's overkill – but some stand out. I'm a big fan of Auto Best Take, which automatically stitches together an optimised group photo from multiple shots, and I love the way you can instantly call up Gemini Live to ask questions, or get information about whatever's around you or what's on your screen.

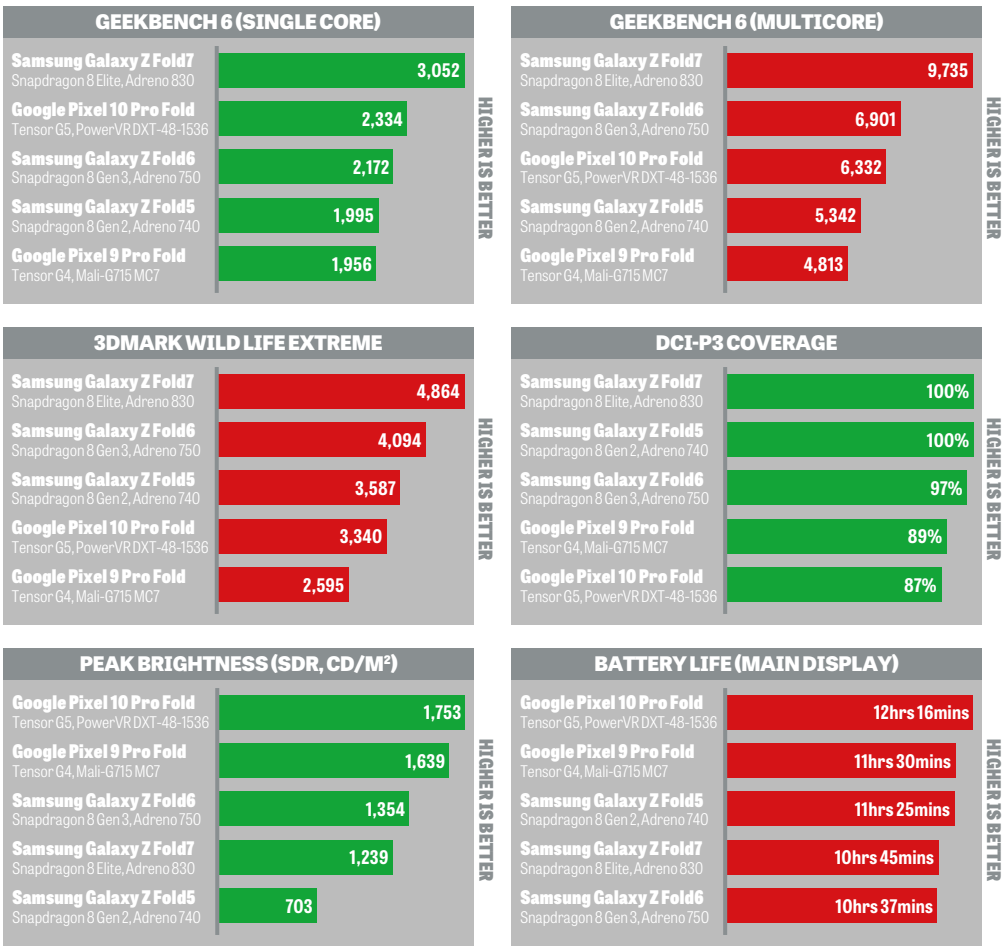
Google's signature Magic Cue feature, however, left me somewhat unimpressed. The idea is ingenious: it's supposed to pop up whatever information you might need in the moment, without having to jump between multiple apps. So, for example, if I phone an airline with a question about my flight, the details ought to show up from my calendar.

Unfortunately, this feature didn't always work for me. When I did have occasion to call United Airlines about an upcoming trip, Magic Cue was indeed smart enough to pull the details from my calendar – but it showed the wrong info, taking flight times from a different email. I also tried sending a text message to myself (from another phone) asking about the photos I'd taken in the park; the Google Photos icon showed up but nothing happened when I tapped it.

How big?

Despite all the good points I've mentioned about the Google Pixel 10 Pro Fold, if you asked me which foldable phone I'd want to carry around each day, I'd choose the Galaxy Z Fold7 without hesitation. That's simply down to the relative size and weight of the two phones. The Pixel 10 Pro Fold measures 5.2mm thick when open and 10.8mm when closed, and it weighs 258g; that's fine for a back pocket, but distinctly larger than the Z Fold7, which is 4.2mm thick when open, 8.9mm closed, and weighs 215g – slim and light enough to carry around in my shirt pocket. The difference is noticeable when you see the phones side by side, and you feel it if you use them for a prolonged period, such as when playing games.

Another relative weak point of the Pixel 10 Pro Fold is its Tensor G5 chip. This may be a top AI performer, but it's well known that Google doesn't optimise its silicon for raw performance. When playing *Destiny: Rising* I saw gorgeous graphics, but noticed dropped frames when lots of enemies were on screen at once.


GEEKBENCH 6 (SINGLE CORE)
Samsung Galaxy Z Fold7 Snapdragon 8 Elite, Adreno 830 3,052
Google Pixel 10 Pro Fold Tensor G5, PowerVR DXT-48-1536 2,334
Samsung Galaxy Z Fold6 Snapdragon 8 Gen 3, Adreno 750 2,172
Samsung Galaxy Z Fold5 Snapdragon 8 Gen 2, Adreno 740 1,995
Google Pixel 9 Pro Fold Tensor G4, Mali-G715 MC7 1,956
HIGHER IS BETTER
GEEKBENCH 6 (MULTICORE)
Samsung Galaxy Z Fold7 Snapdragon 8 Elite, Adreno 830 9,735
Samsung Galaxy Z Fold6 Snapdragon 8 Gen 3, Adreno 750 6,901
Google Pixel 10 Pro Fold Tensor G5, PowerVR DXT-48-1536 6,332
Samsung Galaxy Z Fold5 Snapdragon 8 Gen 2, Adreno 740 5,342
Google Pixel 9 Pro Fold Tensor G4, Mali-G715 MC7 4,813
HIGHER IS BETTER
3DMARK WILD LIFE EXTREME
Samsung Galaxy Z Fold7 Snapdragon 8 Elite, Adreno 830 4,864
Samsung Galaxy Z Fold6 Snapdragon 8 Gen 3, Adreno 750 4,094
Samsung Galaxy Z Fold5 Snapdragon 8 Gen 2, Adreno 740 3,587
Google Pixel 10 Pro Fold Tensor G5, PowerVR DXT-48-1536 3,340
Google Pixel 9 Pro Fold Tensor G4, Mali-G715 MC7 2,595
HIGHER IS BETTER
DCI-P3 COVERAGE
Samsung Galaxy Z Fold7 Snapdragon 8 Elite, Adreno 830 100%
Samsung Galaxy Z Fold5 Snapdragon 8 Gen 2, Adreno 740 100%
Samsung Galaxy Z Fold6 Snapdragon 8 Gen 3, Adreno 750 97%
Google Pixel 9 Pro Fold Tensor G4, Mali-G715 MC7 89%
Google Pixel 10 Pro Fold Tensor G5, PowerVR DXT-48-1536 87%
HIGHER IS BETTER
PEAK BRIGHTNESS (SDR, CD/M²)
Google Pixel 10 Pro Fold Tensor G5, PowerVR DXT-48-1536 1,753
Google Pixel 9 Pro Fold Tensor G4, Mali-G715 MC7 1,639
Samsung Galaxy Z Fold6 Snapdragon 8 Gen 3, Adreno 750 1,354
Samsung Galaxy Z Fold7 Snapdragon 8 Elite, Adreno 830 1,239
Samsung Galaxy Z Fold5 Snapdragon 8 Gen 2, Adreno 740 703
HIGHER IS BETTER
BATTERY LIFE (MAIN DISPLAY)
Google Pixel 10 Pro Fold Tensor G5, PowerVR DXT-48-1536 12hrs 16mins
Google Pixel 9 Pro Fold Tensor G4, Mali-G715 MC7 11hrs 30mins
Samsung Galaxy Z Fold5 Snapdragon 8 Gen 2, Adreno 740 11hrs 25mins
Samsung Galaxy Z Fold7 Snapdragon 8 Elite, Adreno 830 10hrs 45mins
Samsung Galaxy Z Fold6 Snapdragon 8 Gen 3, Adreno 750 10hrs 37mins
HIGHER IS BETTER

This observation was backed up by our labs testing, where we saw the Pixel 10 Pro Fold trail behind the Galaxy Z Fold7's Snapdragon 8 Elite chip by 1,500 points in one 3DMark graphics test. And the Pixel 10 Pro took over two minutes to finish our video transcoding test, compared to 52 seconds for the Z Fold7.

While it's hardly a dealbreaker, I should also mention that the Pixel 10 Pro Fold is limited to running two apps side by side. The Galaxy Z Fold7 can run three apps at once, giving you more flexibility. At least it's easy to create app pairs on the Pixel so that you can drag and drop content between windows.

The bottom line

I like the Pixel 10 Pro Fold much more than I expected to. With big bright screens, great battery life and strong photography credentials, it's a pleasure to use. And the IP68 rating is a load off my mind: finally, I can carry a foldable phone without worrying that it could be ruined by dust and pocket crumbs.

"With big bright screens, great battery life and strong photography credentials, it's a pleasure to use"

In a perfect world, all of this would come in a case as thin and light as the Galaxy Z Fold7. But seeing that's not an option, there's a decision to make. If you want a foldable that offers the portability of a regular phone, you may still prefer the Samsung. But if you can live with a bulkier format, the Pixel 10 Pro Fold is the most capable and versatile folding phone money can buy. **MARK SPOONAUER**

BELOW Both the front and inside displays are searingly bright

SPECIFICATIONS

8-core (3.8GHz/3.1GHz/2.3GHz) Google Tensor G5 processor • 16GB RAM • PowerVR DXT-48-1536 graphics • 8in foldable 120Hz AMOLED screen, 2,076 x 2,152 resolution • 6.4in cover 120Hz AMOLED screen, 1,080 x 2,364 resolution • 256GB/512GB/1TB storage • nano SIM and eSIM • IP68 rating • triple 48MP/10.8MP/10.5MP rear cameras • dual 10MP/10MP front cameras • Wi-Fi 7 • Bluetooth 6 • 5,015mAh battery • USB-C 3.2 Gen 2 connector • Android 16 (7 OS updates) • folded, 76 x 10.8 x 155mm (WDH); unfolded, 150 x 5.2 x 155mm (WDH) • 258g • 1yr warranty

MICROSOFT DEFENDER VS THE WORLD'S BEST SECURITY SUITES

WITH MICROSOFT'S TOOL NOW OFFERING SOLID PROTECTION YEAR UPON YEAR, WE FIND OUT WHICH OF THE SECURITY SUITES JUSTIFIES ITS PRICE

We all know that Microsoft Defender works pretty well. Released in the days of Windows XP's prime in 2006, it had a spluttery start compared to established tools, but thanks to Microsoft's continued investment and the small fact it's installed by default on hundreds of millions of computers – not a bad testbed – it traditionally holds its own in annual tests against malware.

Take a look at the graphs on p94, however, and you'll see that its latest set of results falls behind the rest. If you want the best protection but you don't want to pay then it makes sense to switch to Avast, Avira or the others that we mention in our best free antivirus section on p92.

So, why pay, other than to avoid those painful "UPGRADE NOW!" pop-ups? The answer comes in the ever-more impressive bundle of software that comes with the security suites on test this month. We're not talking about makeweight apps such as password managers and tune-up tools, which are best ignored. We're talking about the apps that genuinely add value.

Top of the list is the obvious: a VPN service has never been needed more than today, and remember these suites cover multiple devices, including your phone and tablet. Other useful extras include ransomware protection, parental controls, device tracking and webcam protection.

We think these are worth the £30 to £50 of our award winners, but we can't emphasise enough that you should either buy from third-party websites or switch off automatic renewal. That way painful surprises lie. But the best way to avoid painful surprises is to read our buying guide and reviews with due care and attention.

CONTRIBUTOR KG Orphanides

CONTENTS

Avast Ultimate 84
Avira Prime 85
Bitdefender Total Security 86
Eset Home Security Ultimate 87
F-Secure Total 88
McAfee+ Ultimate 89
Norton 360 Deluxe 90
Trend Micro Maximum Security 91

Feature comparison table 80
How to choose your perfect security suite 82
The best free alternatives to Microsoft Defender 92
How we test 94
Performance graphs 94
View from the Labs 95

	LABS WINNER			
	Avast Ultimate	**Avira Prime**	**Bitdefender Total Security**	**Eset Home Security Ultimate**
Overall rating	★★★★★	★★★★☆	★★★☆☆	★★★★☆
Website	avast.com	avira.com	bitdefender.co.uk	eset.com
Desktop clients	macOS, Windows	macOS, Windows	macOS, Windows	macOS, Windows
Mobile clients	Android, iOS	Android, iOS	Android, iOS	Android, iOS
Pricing				
First year's price direct	1 PC, £42 (£50 inc VAT); 10 devices, £58 (£70 inc VAT)	5 devices, £43 (£52 inc VAT)	5 devices, £42 (£50 inc VAT)	5 devices, £67 (£80 inc VAT)
Renewal price direct	1 PC, £92 (£110 inc VAT); 10 devices, £117 (£140 inc VAT)	5 devices, £79 (£95 inc VAT)	5 devices, £71 (£85 inc VAT)	5 devices, £96 (£115 inc VAT)
Third-party retail price	10 devices, 2yrs, £25 (£30 inc VAT) from store.pcpro.co.uk	5 devices, 1yr, £28 (£34 inc VAT) from amazon.co.uk	5 devices, 1yr, £25 (£30 inc VAT) from store.pcpro.co.uk	5 devices, 1yr, £96 (£115 inc VAT) from amazon.co.uk
Features				
Firewall	✓	✓	✓	✓
Browser protection: link checking or site blocking	✓	✓	✓	✓
Ransomware protection (dedicated module)	✓	✗	✓	✓
Cloud backup	✗	✗	✗	✗
Webcam protection (dedicated module)	✗	✗	✓	✓
VPN	✓	✓	✓	✓
Password manager	✗	✓	✗	✓
Scheduled scans?	✓	✓	✓	✓
Silent detection/ gaming mode	✓	✓	✓	✓
Parental controls	✗	✗	✓	✓
Device management/ tracking	✓ (mobile only	✗	✓	✓
Bootable rescue disk	✓ (in-client tool)	✓ (free download)	✗	✓ (free download)
Breach monitoring	✓	✓	✓	✓
Data broker removal service	✗	✗	✗	✗
Identity theft/lost wallet support	✗	✗	✗	✗
Test results				
AV-Test Real-world [1]	100%	100%	100%	100%
AV-Test Real-world [1]	100%	100%	100%	100%
AV-Test Reference [1]	100%	100%	100%	100%
AV-Test Reference [1]	100%	100%	100%	100%
AV-Test false positives (total)	0	0	0	0
AV-Test protection score	6	6	6	6
AV-Test performance score	6	6	6	6
AV-Test usability score	6	6	6	6
AV-Comparatives Real-World Protection – % blocked	100%	99.1%	98.2%	99.1%
AV-Comparatives Real-World Protection – false positives	5	0	1	1
SE Labs Protection rating	100%	Not tested	Not tested	Not tested
SE Labs Legitimate Accuracy	100%	Not tested	Not tested	Not tested
SE Labs Total Accuracy rating	100%	Not tested	Not tested	Not tested

[1] AV-Test results are based on four batches of tests. See AV-Test.org for details.

			RECOMMENDED	
F-Secure Total	**McAfee+ Ultimate**	**Microsoft Defender Antivirus**	**Norton 360 Deluxe**	**Trend Micro Maximum Security**
★★★☆☆	★★★★☆	Not applicable	★★★★★	★★★☆☆
f-secure.com	mcafee.com	microsoft.com	uk.norton.com	trendmicro.com
macOS, Windows	macOS, Windows	macOS, Windows	macOS, Windows	macOS, Windows
Android, iOS	Android, iOS	✗	Android	Android, iOS
5 devices, £83 (£100 inc VAT)	Individual, unlimited devices, £142 (£170 inc VAT); Family, unlimited devices, £217 (£260 inc VAT)	Free to Windows users	5 devices, £25 (£30 inc VAT)	5 devices, £25 (£30 inc VAT)
5 devices, £83 (£100 inc VAT)	Individual, unlimited devices, £191 (£230 inc VAT); Family, unlimited devices, £292 (£350 inc VAT)	Free to Windows users	5 devices, £75 (£90 inc VAT)	5 devices, £68 (£80 inc VAT)
3 devices, 1yr, £33 (£39 inc VAT) from amazon.co.uk	Not available (Total Protection – 10 devices, 15 months – costs £15 inc VAT from amazon.co.uk)	N/A	3 devices, 15 months, £8 (£10 inc VAT) from store.pcpro.co.uk	Voucher codes available from eneba.com
✗	✓ (works alongside Windows firewall)	✓	✓	Booster
✓	✓	✓	✓	✓
✓	✓	✓	✓ (cloud backup service)	✓
✗	✗	5GB (OneDrive)	50GB	✗
✗	✓	✗	✓	✗
✓	✓	✗	✓	✗
✓	✓	✓ (via Microsoft Authenticator)	✓	✓
✓	✓	✓	✓	✓
✓	✓	✓	✓	✓
✓	Family plan only	✓	✓	✓
✓	✓	✓	✓	✗
✗	✗	✗	✓ (free download)	✓ (free download)
✓	✓	✗	✓	✗
✗	✓	✗	✗	✗
✓	✓	✗	✓	✗
100%	99.5%	99.8%	100%	100%
100%	100%	100%	100%	100%
100%	100%	100%	100%	100%
100%	100%	100%	100%	100%
0	0	0	0	5
6	6	6	6	6
6	6	6	6	6
6	6	6	6	5.5
98.7%	99.6%	99.1%	100%	0.995
0	2	3	3	52
Not tested	100%	93%	99%	Not tested
Not tested	100%	100%	100%	Not tested
Not tested	100%	97%	100%	Not tested

How to choose your perfect security suite

Spend too little and you may miss out on compelling features; spend too much and you may be wasting your money. When it comes to security suites, it pays to look at the small print

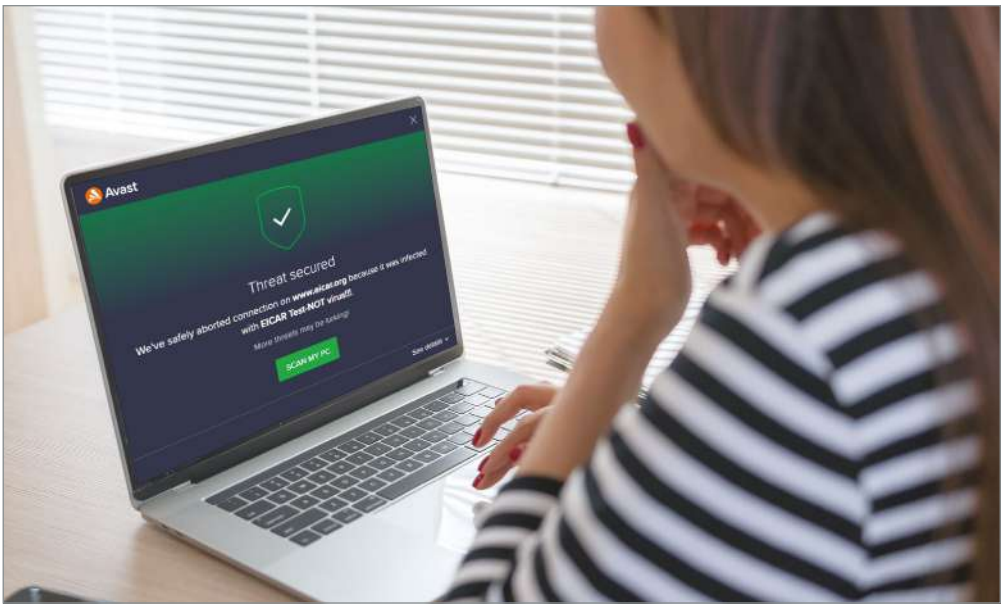
Modern security software packs in countless features, and we cover these as part of each review. But never forget that the key feature you're looking for is protection against malicious software. That should always be your top priority.

That means that real-time malware protection is *the* critical aspect of a security suite. This is a service that continuously monitors your PC for malicious software, primarily by scanning new files and websites your computer encounters.

It's also our minimum bar for inclusion in this group test. For example, the free edition of Malwarebytes is effective and justifiably popular, but, unlike its paid-for version, only provides on-demand scanning.

Every single product in this group test will protect your computer against most malicious software. We know this thanks to the stalwart efforts of a trio of independent testers: AV-Comparatives (**av-comparatives.org**), AV-Test (**av-test.org**) and SE Labs (**selabs.uk**). We publish the key findings of each company's latest results at the top of each review, with more detailed graphs from p94.

Note that we say "most malicious software" in the paragraph above. These organisations also assess edge cases, unfamiliar malware and false positives. The marginal instances that can potentially destroy the health of your PC and all the data it holds.


Avast
Threat secured
We've safely aborted connection on www.eicar.org because it was infected with EICAR Test-NOT virus!!!
SCAN MY PC

ABOVE The best antivirus determines threats by looking at the behaviour of a file

Malware signatures – the hashes of known malicious files – remain important to both real-time and on-demand scanning, and this is why you still see testing houses running flat file scans against large batches of recently collected malware introduced on a disk.

Polymorphic viruses and other forms of obfuscated malware have been around for decades, which is where heuristic scanning comes in

But polymorphic viruses and other forms of obfuscated malware have been around for decades, which is where heuristic scanning comes in: this looks at characteristics and behaviours of a suspicious file or process to determine whether it's likely to be a threat.

Does it use known detection-evasion techniques such as encryption or compression ("packing")? Does it engage in potentially threatening behaviour such as attempting to delete files or terminate processes? Characteristics such as these allow antivirus software to decide whether an unknown program is likely to be a threat or not.

Can it beat Microsoft Defender?

The fundamental question about any third-party antivirus solution is whether it can consistently perform better than Microsoft Defender, which comes built into Windows 10 and 11, and requires no additional software installation or payment.

We cover Microsoft Defender's key features and performance on p92, but the fact that you don't need to install anything new or update any licences makes it a compelling choice when it comes to protecting the PCs of less tech-savvy friends and relations. But that's only assuming that its protection continues to meet the grade.

Due to the huge number of systems it's deployed on, Microsoft has a real

Buying direct or via third parties

In general, suppliers want you to buy direct from their sites. It's curious, then, that they often punish loyal customers with a price rise in their second year. Not that they call it that: they talk of special offers, and this allows them to show promises such as "70% OFF!" But be very careful, as they will auto-renew unless you're careful, and a year later you're hit by the full and often wincingly high price.

ABOVE There are plenty of security software bargains to be found at store.pcpro.co.uk

That's why we will often direct you to third-party retailers. Amazon is generally a solid choice, but the prices fluctuate so check you're not paying over the odds. We also recommend our own *PC Pro* store, as it's one of our specialist areas (and the prices are more consistent than Amazon's).

The only downside to third-party stores is that you may not be able to buy exactly the same package as provided direct. That's especially true for services such as identity tracking. Take a careful look at what's on offer from each product to make sure it's what you want.

advantage when it comes to obtaining malware samples to analyse, which informs not only its malware signature database, but also the behaviour data it has to add to its heuristic rules of thumb for sketchy software.

Microsoft has come to focus on enterprise-grade endpoint protection features that it sells to commercial clients. The basic version of Defender that ships with Windows still provides excellent protection that's more effective than many paid-for third-party antivirus tools. However, its performance has been slipping based on recent data from testing houses.

ABOVE **Some products offer dedicated webcam protection**

Free doesn't equal bad

This month's group test focuses in detail on the best and most relevant paid-for antivirus suites for *PC Pro* readers; these are generally the most feature-packed options from each company. We also try to provide enough information to help you decide if a cheaper product might work better for you.

We should, however, emphasise that free antivirus is not one of those you-get-what-you-pay-for deals. Antivirus companies benefit by getting more data about malware that their free users encounter, by promoting their paid-for products, and by the reputational boost that their free products bring.

More expensive security suites generally include features that are more expensive to provide, from online password managers to cloud backup and even hands-on helplines in case you lose your wallet or have your identity stolen.

Extra features

Our reviews are weighted heavily towards real-time protection against malware. However, most of the products in this group test do a lot more, which is what justifies their status as fully fledged security suites.

Some of these features are specifically to do with device security. For a start, there's ransomware protection that can lock down and/or back up your most important folders. These suites often provide web-based management consoles that allow you to remotely find, lock down or wipe lost computers or mobile devices.

Then there are extra modules such as dedicated webcam protection, which alerts you if an unusual app is accessing your camera. We also see bootable rescue disks to help you recover after a malware infection, and firewall software that, in almost all cases, has a less creaky interface for creating rules than Microsoft's integrated solution.

While it's convenient to get everything bundled together, you're not necessarily going to get the best of all worlds

Other features are still security-oriented, but broader in the net they cast. These are usually things that you might otherwise buy or download as a dedicated service, such as password managers, parental control software, cloud backup services and VPNs.

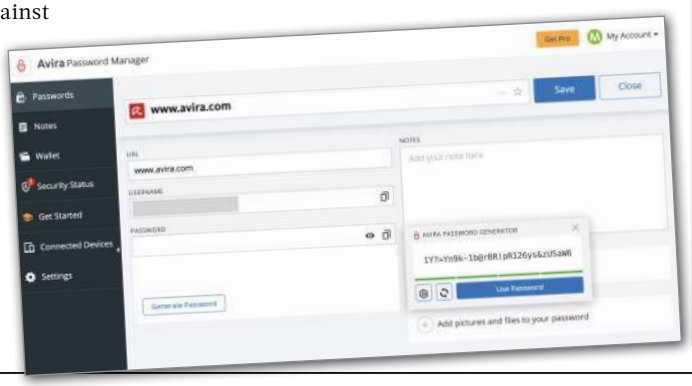
While it's convenient to get everything bundled together, you're not necessarily going to get the best of all worlds, and you don't necessarily want your password manager or cloud backup provider – long-term, high-security subscriptions by their nature – to be tied into a bundle with a malware protection suite that you might decide to swap to another provider in a year's time.

If you're a power user, you probably already have opinions and requirements about many of these things. If you use multiple operating systems, or want a VPN that you can deploy to your router, the VPNs bundled with security suites rarely provide sufficient flexibility.

Bundled parental control suites tend to be mostly okay, with the caveat that they don't do very much that Microsoft Family Safety or macOS Parental Controls don't. Their main advantage is that they offer a cross-platform solution.

The final category of extras consists of tools such as local encrypted data stores, secure file shredders, Registry cleaners, disk usage analysers and even disk defragmenters. Although they can be handy, there are free/open-source applications that do as well or better in almost all cases, so these can be safely ignored as filler.

BELOW **We advise you steer clear of bundled password managers**



Where's AVG this month?

We're very aware that AVG isn't featured in this month's group test, but there's a good reason for that: Avast and AVG are essentially the same product in different clothing. As we give each product an in-depth, full-page review this year, we decided it would be a waste of space to review both brands.

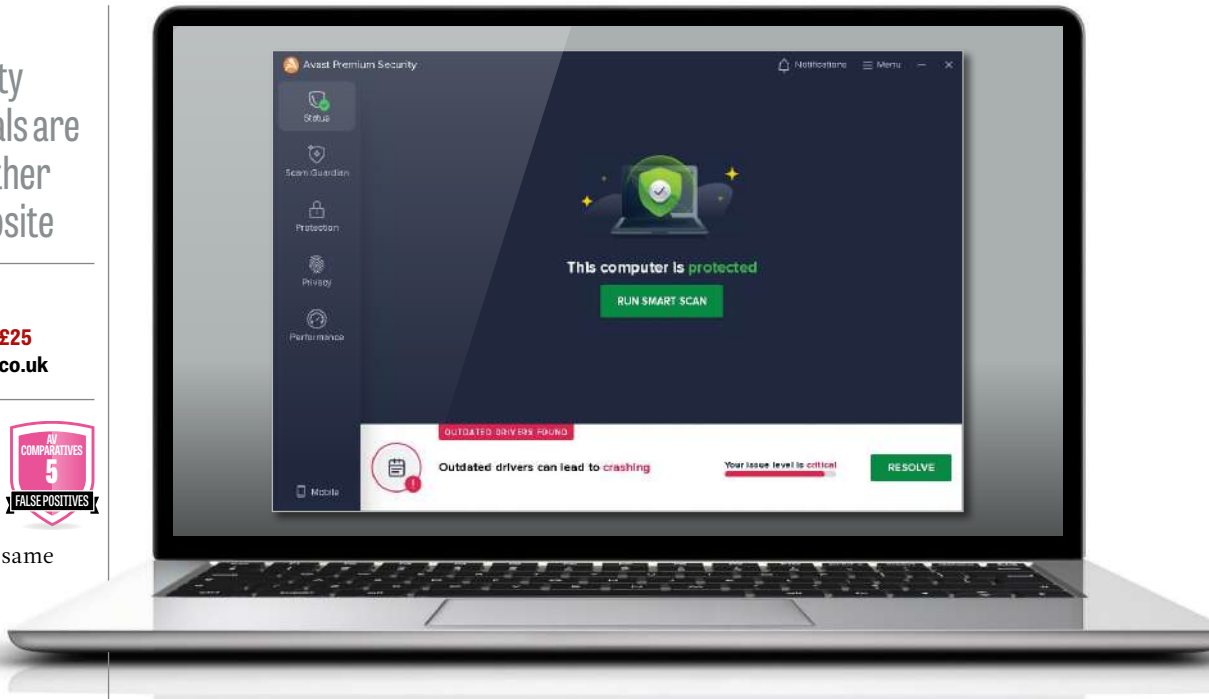
However, before simply plumping for Avast as we cover it this month, it's worth checking out their prices. For example, AVG Ultimate costs £30 from the *PC Pro* store, the same as Avast Ultimate, and you may prefer its interface. As both products offer 30-day money-back guarantees if you download them direct from their respective sites, you can also give them a free trial – but only if you remember to cancel the subscription within the timeframe.

Avast Ultimate

Our top choice security suite, but the best deals are from third parties rather than Avast's own website

SCORE ★★★★★

BEST PRICE 10 devices, 2 years, £25 (£30 inc VAT) from store.pcpro.co.uk



Avast and AVG use the same malware detection engine and tools, wrapped in different desktop clients. We've chosen to review Avast, as AV-Test data shows its client to have less of an impact on system performance than AVG's.

Avast came top of the malware protection tests we use, aggregated from three highly reputable testing houses. It detected 100% of threats in AV-Test's real-time exposure and flat file scanning tests, with no false positives. It similarly scored a 100% total accuracy rating in SE Labs' test, defending against all threats during live malware exposure tests, with no false positive identifications of legitimate software or websites. In AV-Comparatives' real-world tests, it protected against all threats but picked up five false positive identifications. Nonetheless, it's still one of the best performing anti-malware tools in the tests.

When it comes to real-time malware detection and protection, you'd actually be perfectly well off with almost any version of Avast, including Avast Free, as they all use the same malware detection engine, as does sibling antivirus suite AVG. However, we recommend Avast as regular results from AV-Test show that AVG's version of the two services' near-identical clients is a little heavier when it comes to system load, most conspicuously when it comes to website loading and software installation times. The difference is pretty negligible, especially on higher-end hardware specifications, so whichever you find cheapest is as good as the other.

Avast products can be bought either directly from the company, or via third-party retailers, such as Amazon or our own *PC Pro* store. If you prefer to go direct, you can buy Avast Premium Security for £55 initially and thereafter at £85, while Avast Ultimate – which we're focusing on here – costs £65 for the first year and £110 per year upon renewal. Both licences cover up to ten devices.

In either case, make sure to cancel your subscription in advance if you don't want an unexpected price hike. If your subscription runs out before you add a code for a fresh copy of your paid-for version of Avast, it will revert to Avast Free, which still provides very respectable protection.

However, we really do recommend shopping elsewhere as you can find Avast Ultimate subscriptions on sale for less than half the price. For example, a two-year, ten-device subscription currently available at the *PC Pro* store costs £30. Make sure that you don't hand over your billing data for a renewing subscription and you can simply buy new Avast subscription codes when yours runs out.

When it comes to the advantages of the paid-for versions of Avast (and AVG), there are some genuinely compelling reasons to cough up for Avast Ultimate, the top-tier version of the software.

Notable among these are three bonus applications above and beyond the features you get bundled into either the free version or the Avast Premium Security tier. First is Avast SecureLine VPN, a fully featured consumer VPN service that works well on Windows, macOS, Android and iOS. Next up, Avast Cleanup Premium, a reasonably capable and easy-to-use Registry and temporary file cleaner designed to improve performance and free disk space. Finally Avast AntiTrack is an online privacy tool for Windows that blocks and spoofs tracking cookies to prevent advertisers from building a profile of your online activities.

ABOVE **Avast picked up 100% of the threats in the three real-world tests that we use**

PC PRO LABS WINNER

While many of the Registry cleaning and anti-tracking features can be replaced with free tools such as Wise Registry Cleaner, Privacy Badger and uBlock Origin, Avast's extra tools are genuinely useful products that you might otherwise consider paying for on their own, and all of them do what they claim to.

Both Avast Ultimate and Avast Premium Security have more features than Avast Free, including a sandbox in which you can safely run suspect executables, a firewall that's nicer to use than Windows Defender, dedicated webcam protection software, a file shredder, a software update tool and DNS redirection protection. Not a bad haul at all.

Avast is a subsidiary of Gen Digital, which formed when Avast merged with NortonLifeLock in 2022. Norton 360 also appears in this group test, as does Avira Prime, both Avast subsidiaries. Unlike AVG, neither of these shares a detection engine with Avast, although both put in a strong performance in recent tests by AV-Test and AV-Comparatives, making Norton 360 our second choice after Avast Ultimate.

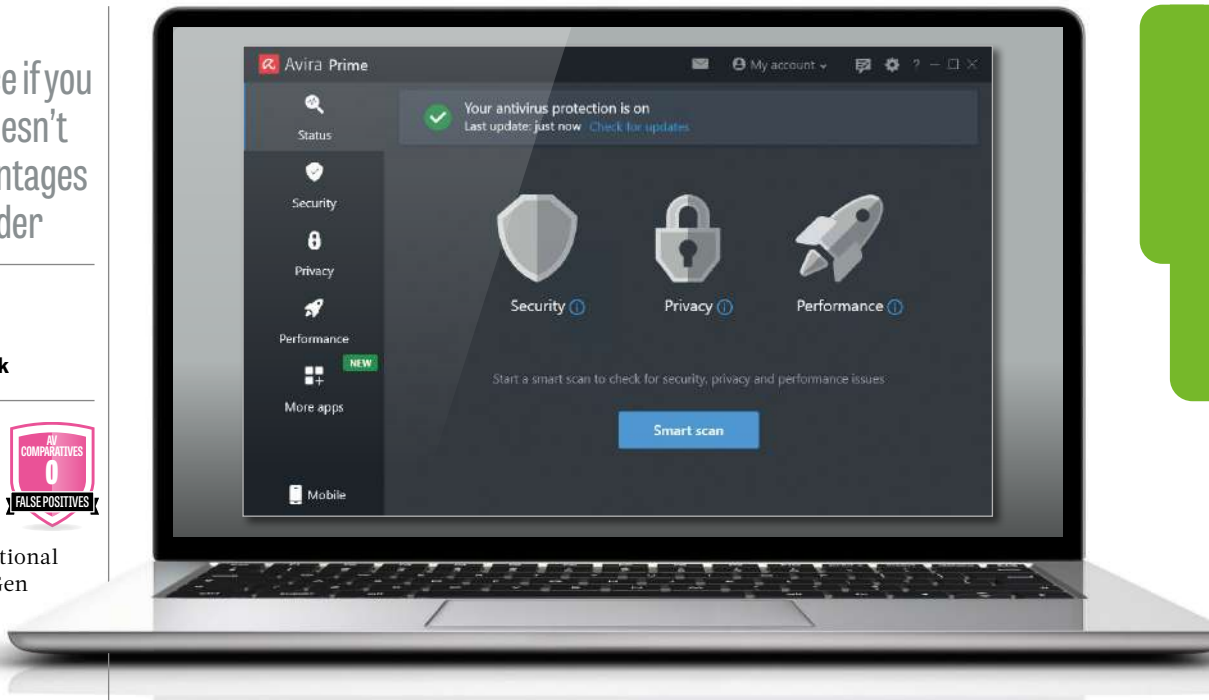
BELOW **Avast Ultimate comes with some useful features that the free version lacks**

Avira Prime

Available at a low price if you shop around, but it doesn't offer significant advantages over Microsoft Defender

SCORE ★★★★☆

BEST PRICE 5 devices, 1yr, £28 (£34 inc VAT) from amazon.co.uk



Avira is part of international cybersecurity giant Gen Digital, which formed in 2022 after US-based NortonLifeLock merged with Czech anti-malware company Avast. Still headquartered in Germany, Avira was at the time a subsidiary of Avast and is now a subsidiary of the Gen Digital holding group.

Avira is available in a number of different versions, including Avira Free Security. This costs nothing but uses the same malware detection engine as all the company's commercial offerings: Avira Antivirus Pro, Avira Internet Security and Avira Prime.

If you subscribe to Avira Prime directly from the company's website, you'll pay £60 for a one-year, five-device subscription, but this renews at £110. Such a steep increase means you should immediately disable automatic subscription renewal. In fact, as with many antivirus and security tools, the most economical way of subscribing to Avira is to buy a subscription code from a third-party retailer. We found a five-device, one-year subscription pack for Avira Prime for only £34 on Amazon UK.

So what extra do you get compared to the free version? Avira Antivirus Pro adds a firewall to your real-time malware protection, while Internet Security address a software updater and password manager – but you definitely don't need to buy the latter from Avira compared to more refined products such as Bitwarden and KeePass. Avira Prime comes with a selection of PC tune-up tools and, most notably, a copy of Avira Phantom VPN.

While not a product that appears regularly in our VPN group tests, Avira Phantom VPN provides a solid service, keeps no identifying user connection data, and is generally a reliable choice if you don't have any particularly specialised requirements from your VPN provider. If you do, though, then you probably already have a favourite.

Avira's malware-detection engine, which is widely licensed by third-party anti-malware tools, performs consistently well, as evidenced by years of results from testing houses. UK-based SE Labs hasn't reviewed it since 2023, but we have recent data from AV-Test and AV-Comparatives.

Like most of its peers, Avira detected 100% of malware in both flat file scanning and real-world exposure tests carried out by AV-Test, with no false positives. However, AV-Comparatives' latest tests were more challenging for all contenders, and Avira blocked 99.1% of malware during a live exposure test with – rather impressively – no false positives.

Note that both of these scores put it close to being on a par with the standard consumer edition of Microsoft Defender that ships with Windows, which differed only in that it picked up some extra false positives in the AV-Comparatives' assessment.

You can also expect similar performance from Avira Free Antivirus, so the outstanding question is: are any of Avira Prime's features sufficiently compelling to make it a better choice for your PC than either integrated Microsoft Defender, its own free tier, or group test leader Avast Ultimate?

That's probably a no for most users. The VPN is reliable but not especially exciting or competitive in a market that includes both performance-focused options such as NordVPN and privacy-first contenders such as Mullvad. The mobile app feels sparse, but includes file scanning, real-time protection and a VPN, as well as monitoring other apps on your phone for potentially dubious activity.

ABOVE Avira Prime performs well but the free version will cover many users' needs

Avira's malware-detection engine performs consistently well, as evidenced by years of results from testing houses

It's not specifically a feature of this security suite, but we've always had a soft spot for Avira's Rescue System disc, a free bootable ISO that you can use to scan your hard disk when malware has got so out of hand that you can't actually get your antivirus tools to load. You can download this for free from Avira's website, and it's well worth keeping on hand for emergencies.

BELOW The mobile app includes file scanning, real-time protection and a VPN

Avira Prime performed well in recent tests and will certainly protect you against the vast majority of malware found in the wild on the internet. If you bought a two-year subscription and it's still running, there's no reason to change to another anti-malware service. However, there simply isn't a strong argument to choose Avira right now, in favour of the more capable protection provided by its sibling and rival Avast.

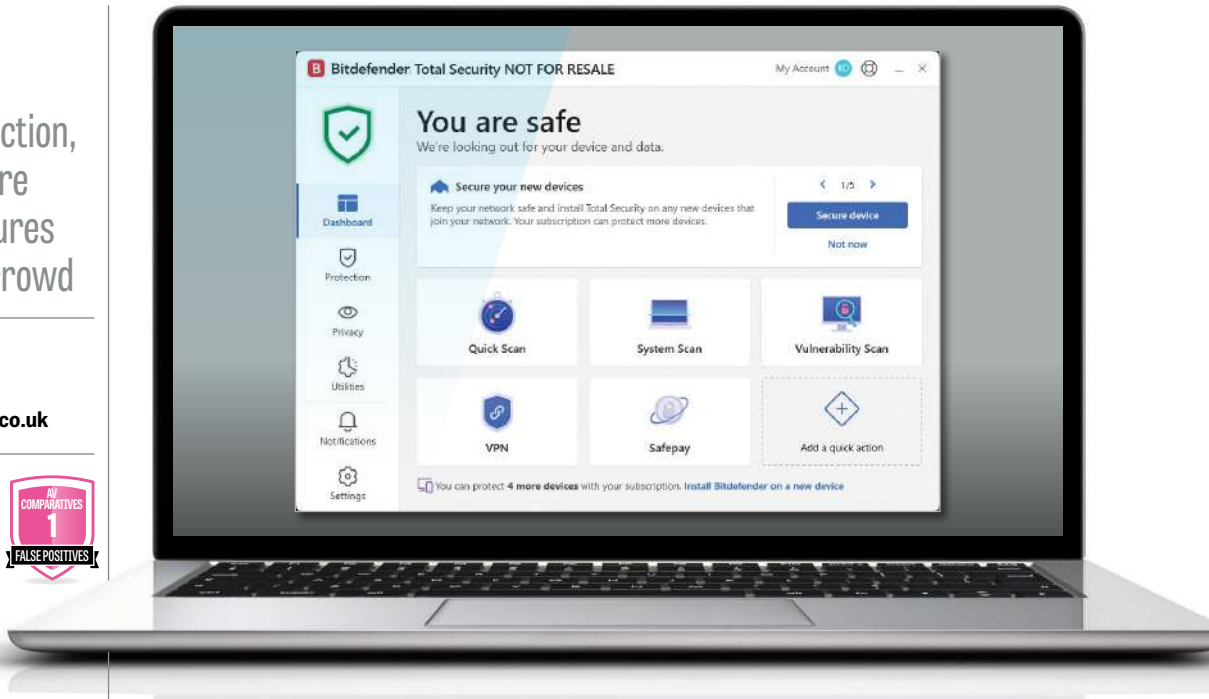
However, if you're looking for a European-based service, without connections to the US, Russia or any large-scale holding companies, you should consider Slovakia-based Eset, which performed very similarly to Avira.

Bitdefender Total Security

Offers effective protection, but neither its malware detection nor its features set it apart from the crowd

SCORE ★★★☆☆

BEST PRICE 5 devices, 1 yr, £25 (£30 inc VAT) from store.pcpro.co.uk



Romanian antivirus firm Bitdefender has grown to become a multinational cybersecurity vendor serving both home and enterprise customers. It's first and foremost a European company, which may reassure those who would rather avoid the USA's privacy and security climate, but is officially headquartered in both the US and Romania. It's a regular in our group tests and has proven itself reliable over the years.

A standard five-device Bitdefender Total Security subscription is £85 per year if you order via the company's website, but the first year's sub for new customers costs £50. If you pause for a minute or two on the site, you'll probably be shown a pop-up with an additional discount code that takes it to £40. A family subscription – with extra parental control options – is £105 per year, or £70 for new subscribers.

As with many cybersecurity suites, the cheapest way to buy Bitdefender is via a subscription code from a third-party retailer, rather than subscribing directly through the company's own site. Currently, you can pick up a five-device, one-year licence for £30 from the *PC Pro* store.

Like most of the products in this group, Bitdefender did well in AV-Test's most recent assessment of home antivirus, correctly detecting 100% of samples in both live exposure tests and a flat file scan of a large set of reference malware samples. It didn't incorrectly identify any benign software as malicious.

While it did reasonably well in AV-Comparatives' latest real-world test – another realistic set of live malware exposures – its percentage blocked score of 98.2% was lower than the score (99.1%) of the version of Microsoft Defender that ships with Windows, our baseline that each security suite has to outperform.

We'd have liked more test results to work with for additional nuance, but SE Labs hasn't tested Bitdefender's home user offering since 2023.

We were a little disappointed to find that the VPN Bitdefender supplies – a white-label version of Hotspot Shield – is limited to 200MB per day, which is somehow less than the standard free version of Hotspot Shield itself, which gives you 500MB. There's no reason to pay for an upgrade to unlimited bandwidth for £30 (this renews at £60) when rival VPN providers such as ProtonVPN and Tunnelbear cost similar amounts.

Bitdefender's protection modules include a vulnerability scanner, breach detection for your primary email address, antispam for local email clients (if you're running Outlook or Thunderbird), a ransomware recovery tool that automatically creates a backup of files if it spots ransomware hitting your system, and a firewall that has a slightly slicker interface than the Windows Defender firewall.

Bitdefender Total Security also includes a password manager called SecurePass. It's only available as a browser extension, and while it's functional, if not especially feature-packed, our position is that you're unlikely to change your password manager as often as your antivirus, and should thus pick one that you like and stick with it. Bitwarden and KeePass are both excellent choices.

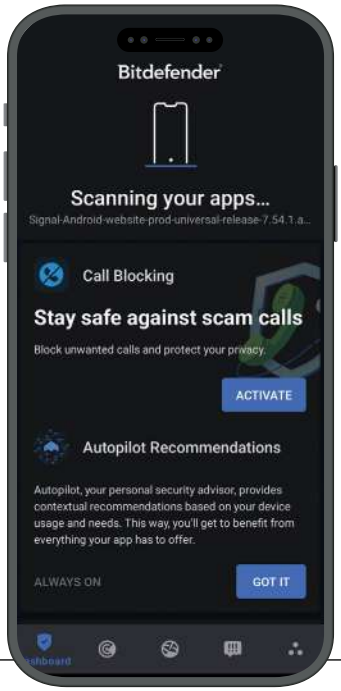
Other extra tools include a file shredder, system optimiser and anti-theft tools to lock or wipe a lost or stolen device via the Bitdefender Central device management interface. Bitdefender Central – a web interface that shows all your account's active devices – provides better device management features than many security tools offer, allowing you to remotely run scans and see their results. Bitdefender also provides basic breach monitoring for up to two email addresses, but you'll need to upgrade to its Ultimate Security (£70 for the first year, £120 thereafter) if you want real-time breach notifications.

ABOVE Bitdefender's web console provides excellent device management features

Its raw detection score isn't enough on its own to justify using it over either Windows Defender or third-party tools

As well as Windows, Bitdefender can be installed on macOS, iOS and Android devices under your licence. The Android app has a fair array of features, including scam and spam call filtering and the same integrated VPN that you get on Windows, but – like many Android security tools – it doesn't allow you to dismiss potentially unwanted program detections if you do, in fact, want the program in question.

BELOW The Android app includes scam and spam call filtering


Bitdefender
Scanning your apps...
Call Blocking
Stay safe against scam calls
Block unwanted calls and protect your privacy.
ACTIVATE
Autopilot Recommendations
Autopilot, your personal security advisor, provides contextual recommendations based on your device usage and needs. This way, you'll get to benefit from everything your app has to offer.
ALWAYS ON
GOT IT

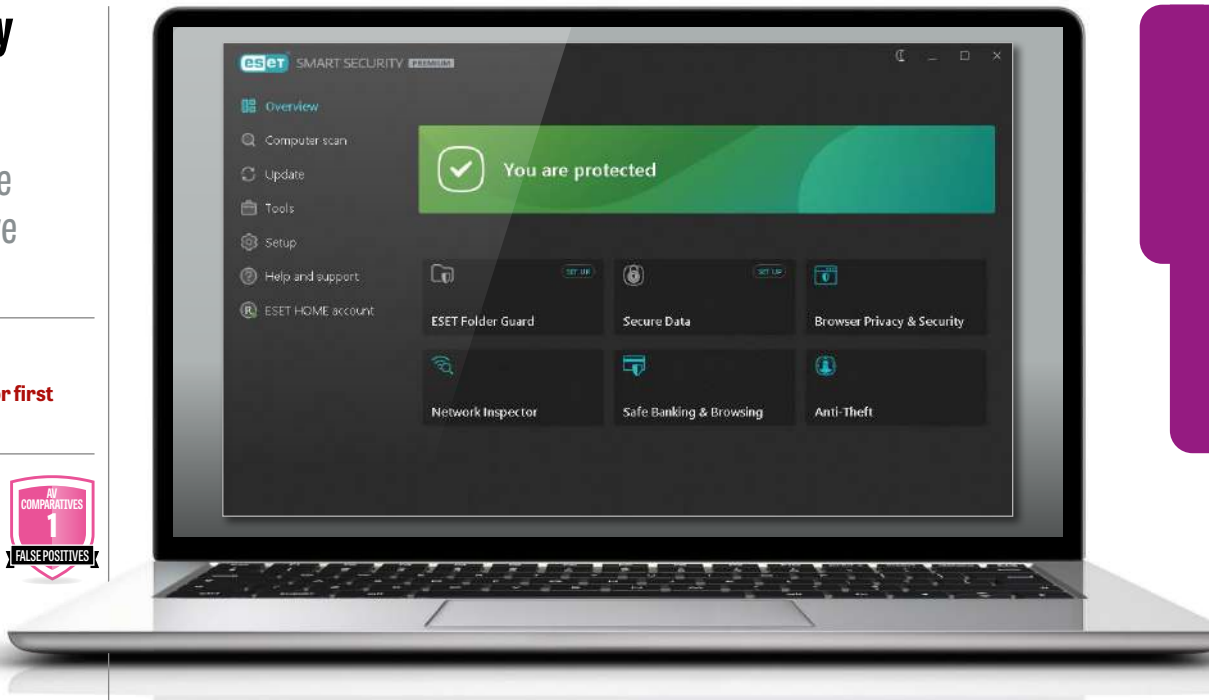
Bitdefender Total Security's malware detection engine will keep you safe against the majority of malicious software that you're likely to encounter, but its raw detection score isn't enough on its own to justify using it over either Windows Defender or third-party anti-malware tools with higher detection rates, such as Avast. The extra features it ships with are also pretty sparse, and we'd have preferred an unlimited VPN.

Eset Home Security Ultimate

A strong all-round proposition with a fine VPN, but it's expensive compared to rivals

SCORE ★★★★☆

BEST PRICE £67 (£80 inc VAT) for first year from eset.com



Eset was one of several antivirus suites whose malware detection engines put in a perfect performance during AV-Test's real-world malware exposure test, during which PCs are exposed to threats as they would be when encountering them in the wild. Likewise its reference malware sample tests, where the antivirus software is instructed to scan a large set of recent samples of malicious files. Notably, it scored 100% in both tests across two months, with no false positives.

Unfortunately, Eset had a worse time of it in AV-Comparatives' latest real-world protection tests. Its protection score of 99.1% – the percentage of malware blocked – matches that of Windows Defender, which, as the default Windows antivirus that ships with the OS, is the benchmark for malware protection performance in our tests. However, Eset only misidentified one benign test item as malicious, giving it one false positive identification, compared to Defender's three.

We sadly don't have any data about the consumer version of Eset from recent SE Labs tests, as its home version hasn't been tested by the UK-based testing house recently.

Eset sells a five-device, one-year subscription for a standard price of £115. Normally this is the point where we would tell you to shop around, but Eset is clearly keeping tight control of its licences: while we found the same subscription at that price from Eset's own Amazon UK shop, we were unable to find keys for Eset Home Security Ultimate at a lower price from any reputable (or even disreputable) seller.

The most notable discount that can be found is Eset's own new subscriber discount, which drops the price to £80 for the first year. As ever, disable renewals if you don't want to be billed at a higher price for the following year.

Eset Home Security Ultimate is the top tier of Eset's home offerings, shipping with a VPN, dark web breach monitoring and extra privacy tools, such as automatic metadata removal on photos you upload. It's also the first Eset tier to come with a five-device licence by default, although you can still add extra devices to Eset's Premium and Essential tiers to give you protection for the same number of computers and smartphones – that's if you don't need Ultimate's VPN, which is its most conspicuous extra feature.

The VPN in question is a white-label version of Windscribe, a regular in our VPN group tests, with an excellent reputation for respecting user privacy, campaigning for accuracy within the VPN industry and keeping its own service regularly updated with new features. Although Windscribe isn't the fastest of the major VPN players, it's reliably quick and a strong choice for streaming Netflix et al.

Like Eset Home Premium, Ultimate includes a password manager and an encryption utility for folders and files. Eset Home Essential is the cheapest tier and provides the baseline creature for Eset Home, with core malware protection, a firewall, and safe banking and browser security tools.

ABOVE Eset Home Security Ultimate ships with the excellent Windscribe VPN

Eset has both free and premium Mobile Security apps, both of which have a clear interface and antivirus, but the premium version adds lost device location, payment protection, spam call filtering and more.

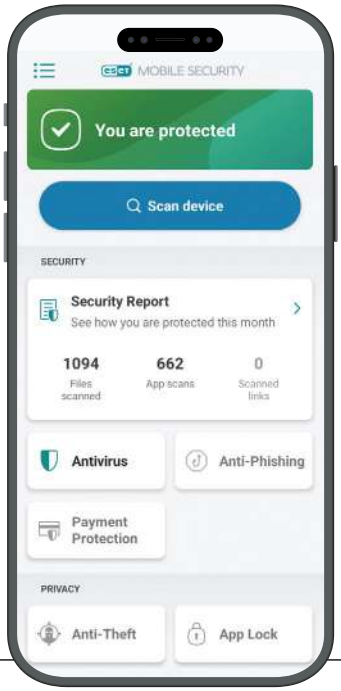
Eset is one of a handful of cybersecurity firms that offers a bootable rescue disk in case your PC is infected to the point where you can't boot Windows or run your antivirus. Eset SysRescue disks can be created as Live USB or CD images, although you need to run a dedicated Windows application to create them, rather than simply burning an ISO.

We like Eset's products. Its malware detection wasn't as effective as Avast and Norton, but it at least matches Microsoft Defender

We like Eset's products. The company's malware detection wasn't as effective in recent tests as those of Avast and Norton, but it at least matches the performance of Microsoft Defender, and the extra features that come with the various tiers are worthwhile. Recent versions of the client also include a new high-contrast mode for users with low sight.

However, while most internet security suites can be found at lower prices from third-party retailers and key stores, this doesn't apply to Eset, which keeps rigorous control over its licences. This means that, while you can get a premium subscription to Norton or Avast for around £30, you'll pay from £80 to £114 for Eset's counterpart. And it's just impossible to justify the extra cost.

BELOW Eset offers free and premium Mobile Security apps

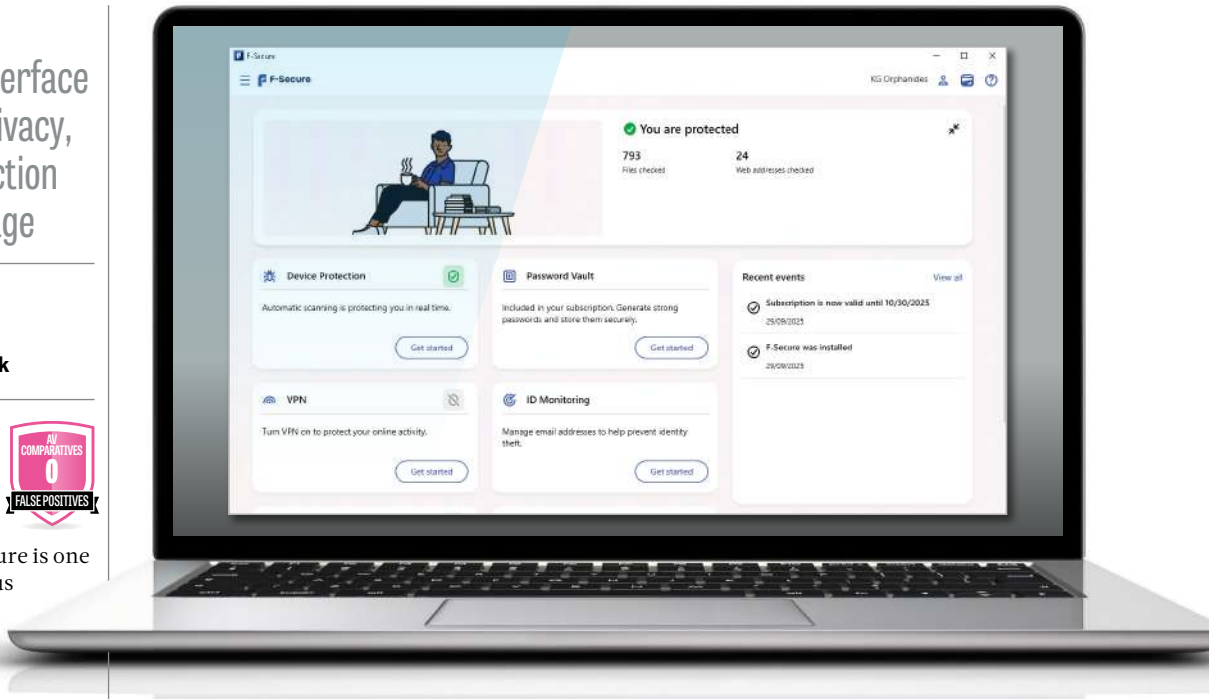


F-Secure Total

We like F-Secure's interface and its respect for privacy, but its malware detection performance is average

SCORE ★★★☆☆

BEST PRICE 3 devices, 1yr, £33 (£39 inc VAT) from amazon.co.uk



Based in Finland, F-Secure is one of a handful of antivirus firms, along with Eset and Bitdefender, that is based in the EU. F-Secure uses a combination of malware detection engines, including its in-house Capricorn engine and Avira's detection engine, as well as cloud-based analysis for its various scanning and real-time detection operations. It generally does well in tests by AV-Comparatives and AV-Test, and this quarter was no exception: it detected 100% of malicious files in real-time exposure and flat file scan tests by AV-Test, with no false positives, as did many of its rivals.

AV-Comparatives' latest real-world (live malware exposure) tests proved more challenging for most participants. Impressively, F-Secure still didn't misidentify any benign files or websites as threats, but it had a protection score of 98.7%. That's among the lowest in this group test, underperforming both Avira Prime (despite sharing its engine) and Microsoft Defender. There's no point in installing third-party software that's less efficient than the service you get for free.

Sadly, we don't have any recent test data from SE Labs about F-Secure's performance, so there's no option for a tie-breaker there, which means it's hard to wholeheartedly recommend F-Secure on the critical basis of malware detection and blocking. It will definitely keep you safe against the vast majority of online threats, but on the most recent evidence it won't do a better job than any of its rivals.

Still, we like the F-Secure client's clean and spacious interface. On first launch, you're prompted to set up various features, such as browser extensions, a password manager, breach alerts, identity theft support and a VPN.

Formerly known as F-Secure Freedome, F-Secure VPN isn't a service that we regularly include in our VPN group tests, but it has always worked well and doesn't keep any identifying information about your use of the service. It's regularly updated with new features, and currently supports the Hydra, WireGuard and OpenVPN protocols, with endpoints in 28 countries.

It's a perfectly fine choice, then, as is the password manager, but if you have specific preferences for VPN or password management tools then you could buy F-Secure Internet Security instead of F-Secure Total. However, the disparity in their features isn't always reflected in their pricing at third-party retailers.

And F-Secure Total is, like many of its rival security suites, much cheaper if you buy it from a third-party retailer and activate the supplied key, rather than subscribing directly from F-Secure. Here, an annual subscription costs £60 for one device, £80 for three devices and £100 for five. When you can buy a three-device, one-year sub for £39 on Amazon UK there's really no choice. Beyond third-party retailer pricing, there are no discounts for new subscribers – or, to put it another way, no unexpected price hikes for established customers after the first year.

Depending on how many devices your subscription covers, you can add extra computers, smartphones and tablets to your account. These case be either your own or someone else's, and we remain impressed by the management interface for secondary users, which include some of the best parental management tools we've encountered in a security suite. These cover content filtering and time management but don't engage in privacy-violating behaviours such as snooping on your children's messages.

ABOVE F-Secure's nice interface can't make up for sub-optimal performance

We're keen to support tools made in the UK and EU, but F-Secure's performance doesn't provide any advantage over Microsoft Defender

The Android and iOS apps provides the scanning for malicious and unwanted files that it promises, but can be oversensitive. For example, when the Android application, like Bitdefender's, flagged a potentially unwanted app – APKPure, which we had installed deliberately on our phone – as a threat, the only option for remediation was to remove it. We couldn't simply close the threat warning by stating that we wished to keep the app.

Because of comparatively strong privacy regulations, we're keen to support antivirus tools made in the UK and EU, but F-Secure's detection performance doesn't provide any advantage over Microsoft Defender and may even perform worse. The extra features it ships with – VPN, password manager, identity protection and parental controls with content filtering – work entirely adequately but fail to stand out in this highly competitive market.

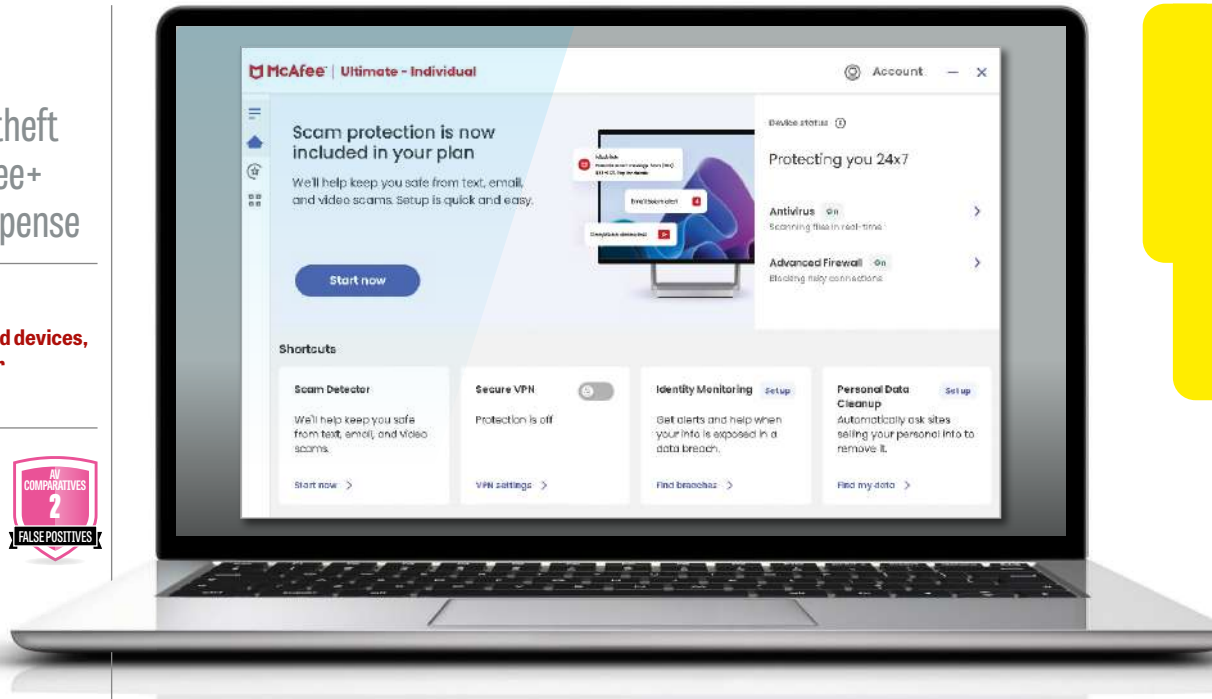
BELOW The Android and iOS apps can be a little oversensitive

McAfee+ Ultimate

If you want hands-on support and identity theft protection, the McAfee+ range is worth the expense

SCORE ★★★★☆

BEST PRICE Individual, unlimited devices, £142 (£170 inc VAT) for first year from mcafee.com



ABOVE McAfee+ Ultimate adds bags of extra features to justify its high price

Compared to all the other products here, it may seem ridiculous that McAfee is charging £170 for its services, especially as that rises to £230 after the first year. However, those heady subscription fees buy you a huge amount of technical support and hands-on services, from assistance in setting up your protection to finding and removing your unused accounts – and having your personal information removed from data broker websites. You also get identity theft and ransomware insurance, along with access to one-on-one support from an identity theft restoration expert if necessary.

If you have a family to protect then a McAfee+ Ultimate subscription costs £260 for the first year and £350 per year thereafter. That covers unlimited devices for each of six users in your family. At least it's now easier to opt out of automatic renewals for McAfee products, after numerous slaps on the wrist by UK regulators.

All those extra and costly features are helpful for those with busy lives or those who can't or don't wish to invest the time required to become their own cybersecurity expert. On the other hand, if you like to get hands on with your own security tools and settings, it might be the exact opposite of what you want or need. We also weren't too impressed to find that uninstalling McAfee's Windows client required an old-school removal tool when uninstallation failed via Windows' add/remove programs interface.

At this price it should be no surprise that you get plenty of features for all your devices with a McAfee+ subscription, including a VPN, password manager, file shredder, social media privacy manager (this will help tighten up your security settings across multiple social networks), a firewall that integrates with Windows' firewall as a somewhat pointless supplementary interface, and parental controls with time management, content filtering and device tracking if you have a family account.

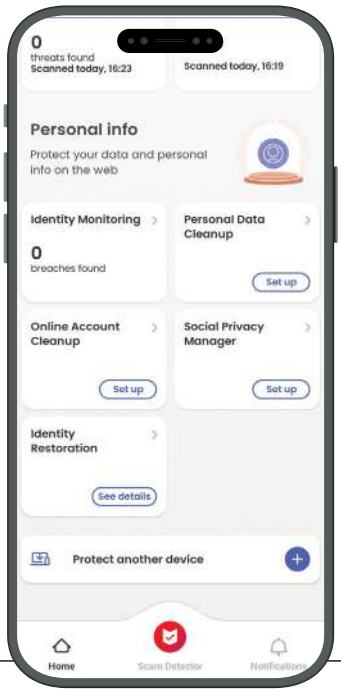
When it comes to the important fundamentals of malware detection, in recent years McAfee's engine has been good enough to protect you against most malicious software, but doesn't have the degree of accuracy that we've come to expect from the likes of Avast or Norton. This still holds true, but it's catching up.

McAfee did unusually well in the latest tests by UK-based SE Labs, with 100% across the board, meaning that it protected against all malware threats with no false identification of benign programs and websites as threats. This outperforms Microsoft Defender – our reference, as it ships with Windows – by a significant margin.

We were surprised to see it pick up a less-than-perfect score in AV-Test's latest round of testing, dropping to 99.5% accuracy in one of two month-long sets of real-world malware detection tests, but scored 100% across the other real-world exposure test and both months' flat file scans of malware samples to give it an overall score of 99.9%. It didn't make any false positive identifications but slightly underperforms Microsoft Defender here.

McAfee has committed to identity protection and insurance in a way that few of the consumer antivirus firms have

BELOW The highly personalised support includes identity theft insurance



While its performance in AV-Comparatives' most recent real-world protection tests wasn't perfect, it again performed better than Defender, protecting against 99.6% of malware exposures with two false positive identifications of benign software, versus Defender's 99.1% protection accuracy and three false positives.

You can only buy McAfee+ Premium, Advanced and Ultimate plans directly from the company's website. This means that, unlike most of the security suites in this group test, you can't pick up a discounted copy from a third-party retailer. As this is the best source of discounts, it means that McAfee+ Ultimate is definitely the most expensive choice here.

However, McAfee has committed to identity protection and insurance in a way that few of the consumer antivirus firms have, and this makes it difficult to draw a direct comparison between its top-tier product and those of its rivals, as there's a practical and philosophical difference at work here.

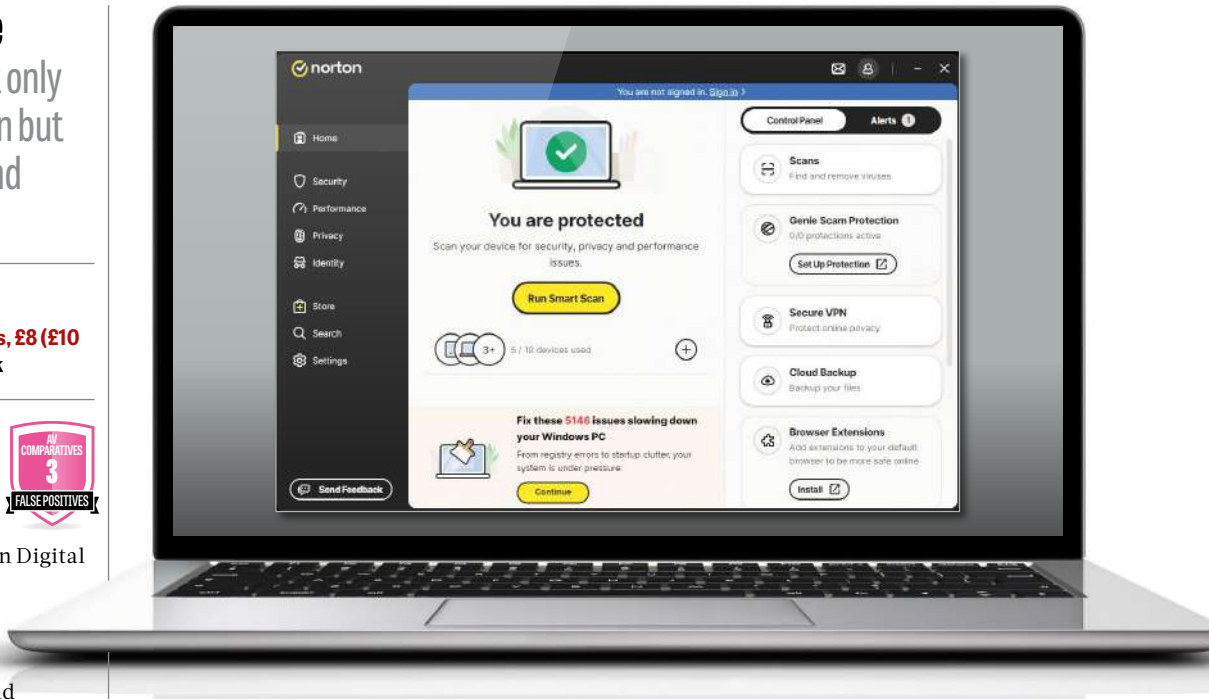
If a focus on identity protection and hand-holding support appeals, McAfee+ Ultimate offers a distinct set of features that you won't find elsewhere. But if you're after a standard security and privacy suite, Avast is both a cheaper option and – per current test results – one that offers better protection against malware.

Norton 360 Deluxe

A standout choice not only for malware detection but also extra features and value for money

SCORE ★★★★★

BEST PRICE 3 devices, 15 months, £8 (£10 inc VAT) from store.pcpro.co.uk



Norton is part of the Gen Digital group, making it a sibling company of Avast, AVG and Avira, but while Avast and AVG share detection engines, Norton and Avira continue to be developed independently. That's good news for anyone who likes choice, especially as Norton's engine is one of the best performers in our aggregation of results from three different anti-malware testing houses.

Norton 360 was one of several antivirus suites to earn a perfect score in AV-Test's latest real-world and flat file-scanning tests, correctly identifying and protecting against all the malicious programs thrown at it, and with no false positive identifications of benign software as potentially malicious.

It also scored a perfect 100% in AV-Comparatives' real-world protection tests, meaning that it blocked every malware sample in a realistic live exposure test of its real-time detection chops, albeit with three false positive identifications. Of the products we selected to include here, only Avast was similarly accurate, although it got two extra false positives.

Finally, Norton earned a 99% protection score from SE Labs, blocking 397 out of 400 malware exposure incidents. The UK-based testing house gave Norton a 100% legitimate software accuracy rating. However, if blocking malware counts more to you than never interfering with your installation of benign software, you might weight Avast and McAfee's performance in this test slightly above Norton's, as both blocked 400 out of 400 malware threats.

We tested Norton 360 Deluxe, which gives you support for five devices, plus a VPN, dark web monitoring (this will alert you if your primary email address appears in a breach) and parental controls. The standard price of a one-year subscription is £89, although Norton tempts new subscribers with a £30 fee for the first year, but be sure to opt out of automatic renewal to avoid a steep price hike. However, the best way to buy Norton 360 Deluxe is via a third-party retailer, and the *PC Pro* store offers a 15-month subscription for a mere £10. If you want to cover more devices than five, consider Norton 360 Premium from the same store: this provides two years of cover for ten devices for £20.

Cheaper tiers – Standard and Plus – only cover a single device. Buy from Norton and Standard costs £35 per year, rising to £65 for Norton 360 Plus; these prices drop to £20 and £25 respectively for new subscribers, with our usual caveats about auto renewals.

Both products include a password manager and varying sizes of cloud backup, plus some machine learning-based AI tools for deepfake and scam detection. Note, however, that deepfake video detection requires a Windows Copilot+-certified PC.

The Genie scam detection tool uses an LLM to parse suspicious images, messages and websites. It's also available as a free app on the web, Android and iOS. There's another freebie, too: Norton Rescue Disk helps you recover a PC rendered unbootable or inoperable due to malware.

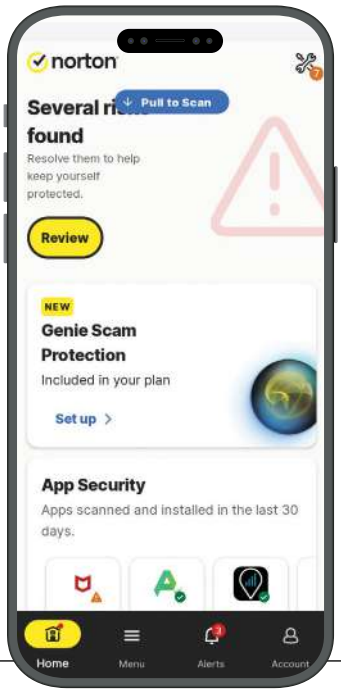
Standard subscribers get the same VPN as Deluxe users. Norton's VPN is basic, and never comes at the top of our VPN group tests, but it's a handy addition given the price. We're not especially taken by the password manager. It's functional, but we prefer KeePass and Bitwarden, depending on whether you'd rather manage your password file yourself or leave that to an online service provider.

If you've been looking at the identity protection features of rival McAfee+ Ultimate, you might want to cast your eye over Norton 360 Advanced, which is much cheaper even at its standard annual price of £150. You don't get insurance or help removing your personal information from data broker sites, but it does add identity restoration support, a UK credit report and alert service, stolen wallet assistance, and a social media monitoring tool that can provide protection against account takeovers and check for inappropriate or dangerous content. It also includes a financial monitoring tool that can keep an eye on unexpected transactions in bank accounts that you link to it.

Still, Norton 360 Deluxe is the sweet spot option from Norton in our book as it packs plenty of useful features at incredibly low prices. Avast Ultimate takes the edge for its performance in SE Labs' tests and its better-performing VPN, but either program would be a great choice for your household – and some users will be tempted by the generous 50GB cloud backup service that comes with Norton 360 Deluxe.

ABOVE **Norton 360 Deluxe provides superb protection and lots of useful features**

BELOW **The Genie scam detection tool is available as a free app for Android and iOS**

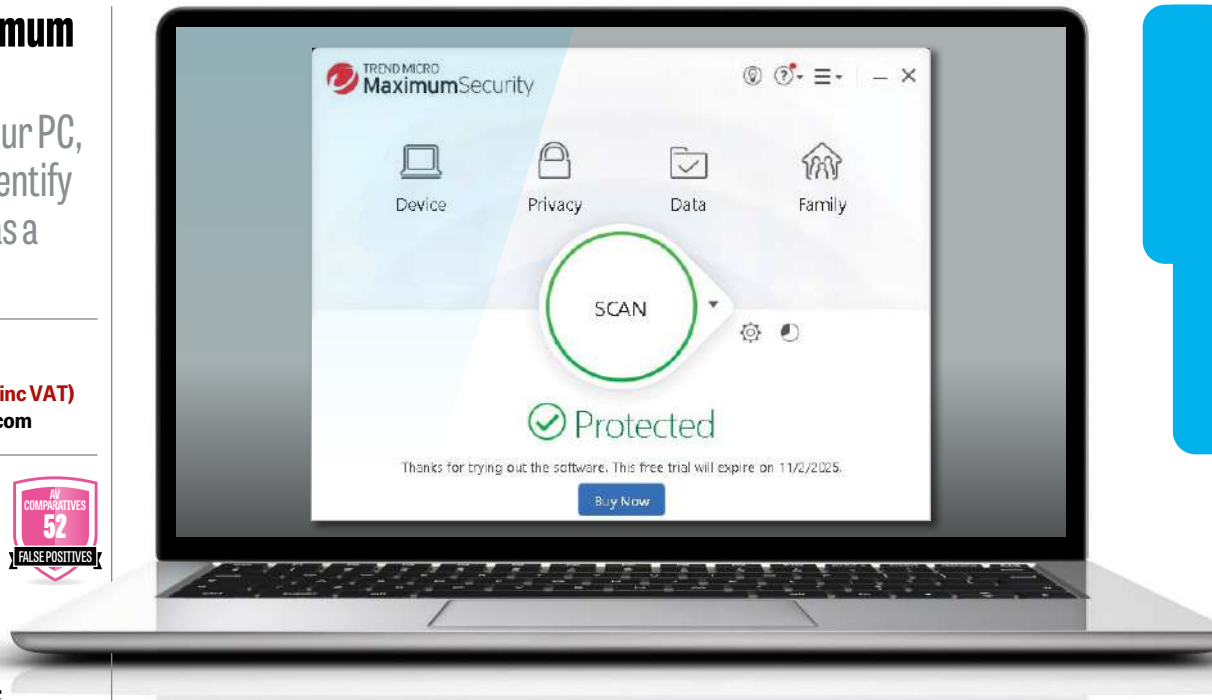


Trend Micro Maximum Security

Great at defending your PC, but too likely to misidentify legitimate software as a potential threat

SCORE ★★★☆☆

BEST PRICE 5 devices, £25 (£30 inc VAT) for first year from trendmicro.com



Maximum Security is an apt name for this suite. Rather than let any misbehaving file escape its clutches, it's twitchy to the point of paranoia: in AV-Comparatives' test, it picked up a shocking 52 false positives. By comparison, Avast flagged five false positives and everything else here identified three or fewer.

However, it's extremely effective. It blocked 99.5% of genuine malware in the AV-Comparatives test, which is better than Microsoft Defender and most other services. The notable exceptions include our award winners, Avast and Norton 360.

We had to refer back to AV-Test's March/April 2025 results to obtain data for Trend Micro, as it doesn't appear in the latest round of testing. This perhaps reflects the company's growing focus on business AV solutions. Back in April, it earned a perfect protection score in AV-Test's real-world tests, in which a system is exposed to live malware in a natural setting, and its reference tests, where the software scans a set of recently collected malicious files. However, it was also unusual in its detection of false positives in AV-Test's tests: most suites misidentified zero or one as a threat, while Trend flagged five.

SE Labs hasn't included Trend Micro in its recent anti-malware tests. However, it's clear from the data we already have that Trend provides solid protection at the cost of being twitchy about legitimate software. This means it requires more hands-on interaction from the user, and that you'll have to make decisions about whether any given threat alert is accurate or not. Even highly informed users in a position to do so would probably rather not be bothered so regularly by their antivirus tool, while those who aren't confident could quickly be out of their depth.

Another reason this suite's name is apt is that its US headquarters are in Texas, famed for its prisons, despite being founded in California back in 1988. It also has HQs in Taiwan and Japan, making Trend Micro one of the more multinational firms here.

Its breadth extends to OS support, with ChromeOS available as well as Windows, macOS, Android and iOS. Maximum Security is the company's top consumer cybersecurity suite, and that's reflected in its prices: a five-device licence costs £80 per year as standard, while new subscribers can nab their first year's sub for £30 via Trend's website.

As is the case with most antivirus software, the cheapest way to obtain a licence is via third-party retailers. Here, though, we struggled to find it on "reputable" sites, with our most promising results coming from key-selling site Eneba; we tend to avoid recommending these as we don't know the origin of the codes. However, during testing we found a five-device, three-year licence available for around £10, so buy at your own risk. Incidentally, it doesn't matter if you buy a version of Maximum Security that's older or uses a slightly different name (such as Trend Micro Titanium) – you can still activate it via Trend's website.

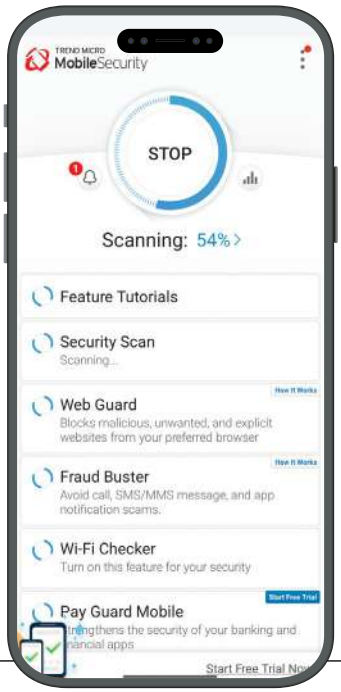
If you don't need mobile device support or a password manager (Trend Micro's is nice to use, but we still recommend making a commitment to a specialist password manager such as KeeWeb or Bitwarden), then consider buying Trend Micro Internet Security instead. Its standard subscription price is £60, although it can also be found for significantly less via either special offers or third-party retailers.

ABOVE Trend Micro has lots going for it, but will require plenty of user interaction

It's clear from the data we have that Trend provides solid protection at the cost of being twitchy about legitimate software

It lacks 24/7 premium support, which Maximum Security bundles, but both suites give you parental controls. These include screen time limits and content filtering. You also benefit from social media privacy analysis tools and a system optimiser.

Or perhaps you just need the basic antivirus, ransomware protection, email scam protection and secure online payment sandbox, in which case you can save a literal bundle by opting for Trend Micro Antivirus+ Security, with an RRP of only £20. Note, however, that only Maximum Security supports any operating systems apart from Windows.



BELOW Trend Maximum Security supports Android and iOS, plus ChromeOS

Trend Micro is one of the few antivirus firms that still publishes a bootable rescue disk that allows you to scan your PC when its OS won't boot. The rescue disk tool isn't part of the Trend Micro Maximum Security suite per se, but is freely available for anyone to download.

If it weren't so twitchy about false positives, Trend Micro's clear interface, simple feature set and reasonable costs would make it an easy service to recommend. However, most users don't want to spend too much time interacting with their anti-malware protection, and this keeps Maximum Security off our winners list.

The best free alternatives to Microsoft Defender

Installing the best third-party antivirus product not only boosts protection, it also brings some potentially useful features

When we talk about Microsoft Defender this month, we're talking about the basic out-of-the-box protection that comes with Windows 10 and 11 (not to be confused with the variety of Microsoft's paid-for services by the same name, such as Microsoft Defender for Business). It's pretty good, but it's not currently the best free antivirus around in terms of malware detection and accurate assessment of benign but unknown or obscure software.

We're exclusively covering free antivirus software with a real-time protection component here. This rules out popular antivirus tools such as Malwarebytes Free, which only provides on-demand scanning. This can be useful to sit alongside your real-time malware defences, in case you want a second opinion on a suspicious file, for example, but doesn't meet our requirements that malware protection must be constantly active.

As we've discussed elsewhere, most consumer antivirus suites' core malware detection engines remain consistent between free and paid-for versions. This means you can assume that the results of malware-detection tests carried out by organisations such as SE Labs, AV-Test and AV-Comparatives can be applied to both free and paid-for versions of the same software. And that means the protection performance of Avast (and thus AVG, which uses the same detection engine), Avira and Bitdefender's free offerings is directly comparable to that of the versions shown in our graphs on p94.

This means our pick for best free antivirus is clear: Avast Free Antivirus.

Avast Free Antivirus: our number one pick

Avast is a regular recommendation of ours and has been for years. Although the Czech company merged with US-based NortonLifeLock to form Gen Digital in 2022, its development remains independent from that of its stablemates, which include Norton Antivirus and Avira Free Antivirus.

It provides remarkably effective real-time protection against malware threats, as well as on-demand scanning, a tool that allows you to create a bootable rescue disk, data breach alerts for your email address, a ransomware shield that prevents untrusted applications from modifying (and thus encrypting) your personal files, and Wi-Fi security vulnerability detection. It even supports silent detection, which you can enable in its settings.

ABOVE **It may be free, but Avast Free Antivirus provides lots of useful features**

These are the most important features of our Labs-winning Avast Ultimate, although the free version conspicuously lacks the VPN, anti-tracking, Registry and disk space clean-up tools. You also lose webcam protection, the firewall, a sandbox to run suspicious apps and multi-device management.

However, if all you need is no-frills malware detection, Avast Free might even be a better proposition than Ultimate, because of its simplicity. You don't even need to register Avast Free to use it. If you prefer to obtain your antivirus, VPN and PC optimisation tools separately – for example, if you're an experienced PC user with your own opinions about these products – then this simple free antivirus suite is definitely worth your attention.

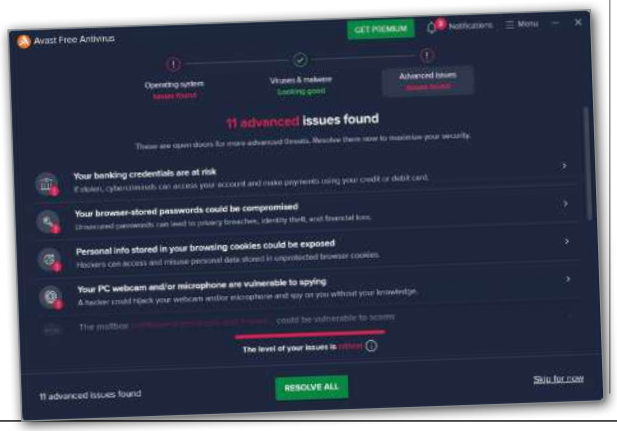
Like its paid-for counterpart, Avast Free has recently introduced an AI-based scam detector. This is built into Avast's Scam Guardian tab in the form of a stringently topic-limited chatbot assistant. You can ask the assistant about specific apps and software packages by name, paste in potentially malicious URLs, as well as images or the text of messages you suspect may be fraudulent. This is helpful in an age of increasingly convincing spam and scam emails that are themselves produced using an LLM such as ChatGPT.

Avast Free is light on system resources and – unlike Microsoft Defender – will run on versions of Windows that are end of life

Avast has also added an AI component to the established Web Guard modules, which warns you about known malicious and fraudulent websites when you're browsing.

While detailed test data doesn't yet exist for the accuracy of Avast's LLM-based components, machine learning has been a key element of malware detection for over a decade. Sadly, we also can't speak to the potential power consumption of Avast's interactive assistant, although its limited subject areas should reduce demands.

Avast Free is available for Windows, macOS, Android and iOS. It's light on system resources and – unlike Microsoft Defender – will run on versions of Windows that are end of life, including Windows 7 and 8. This support for older platforms is by no means exclusive to Avast, but it's definitely worth bearing in mind, as not all antivirus software supports Windows versions below 10.


Avast Free Antivirus
GET PREMIUM
11 advanced issues found
Your banking credentials are at risk
Your browser-stored passwords could be compromised
Personal info stored in your browsing cookies could be exposed
Your PC webcam and/or microphone are vulnerable to spying
RESOLVE ALL

BELOW **You'll have to put up with an element of upselling with most free antivirus products**

QNAP® SEAGATE

Unlock Next-Level Storage Power
High-Capacity Pre-Configured NAS

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30TB of Possibilities. Now on QNAP NAS.

Maximise your storage scalability with all-in-one solution.

Your projects are growing faster than ever, mission-critical business files, 4K/8K video archives, creative workflows, or AI datasets. Now, you don't have to choose between performance and capacity.

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- Enterprise-grade reliability that keeps data safe and sound.
- Simple scalability without the hidden costs and complexity of cloud-only storage.

Reliable. Secure. Always Ready.

- **Scale up:** Expand into multi-petabyte environments with ease.
- **Collaborate more:** Share and access large projects without bottlenecks.
- **Protect everything:** From creative assets to critical business data.

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BEST NAS MANUFACTURER

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How we test

We get hands-on with every single product in the group test, ensuring that its features and interface all work as they're supposed to and highlighting any friction points. However, long-term testing with live malware samples is required to evaluate how genuinely effective any given antivirus solution is at protecting your system against malicious software.

For this, we turn to data produced by three well-regarded anti-malware testing houses. Specifically, SE Labs in the UK, AV-Test in Germany and AV-Comparatives in Austria. All three publish their test data and methodologies, making them available to the public, as well as the press and industry professionals.

Data for this group came from the following tests: AV-Test Windows 10 antivirus software for home users, June 2025 (**tinyurl.com/375avtest**); AV-Comparatives Real-World Protection Test, July-August 2025 (**tinyurl.com/375avcomp**); and SE Labs Home Anti-Malware Protection Report 2025 Q2 (**tinyurl.com/375selabs**).

LEFT UK-based SE Labs' test results are available to all

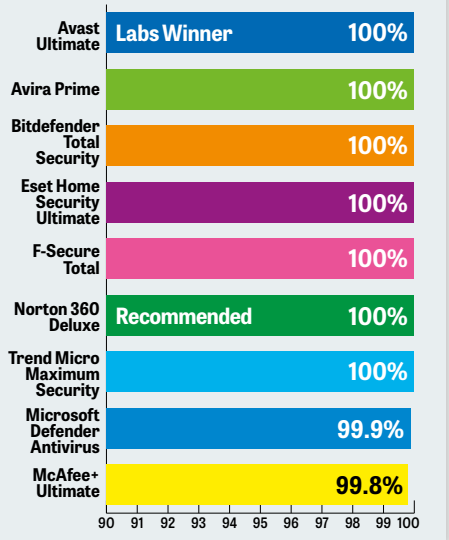
We've used the most recent available test data in all cases. Where a specific product isn't tested, we use results for products using the same malware detection engine. In cases where a product has not been tested recently by all labs, we've referred back to historic test data to provide insight into its long-term performance.

In evaluating test data, we place the greatest weight on "real-world" testing, in which antivirus software is exposed to live malware samples in a realistic scenario, such as web exposure, rather than flat file scans of a large collection of malware samples.

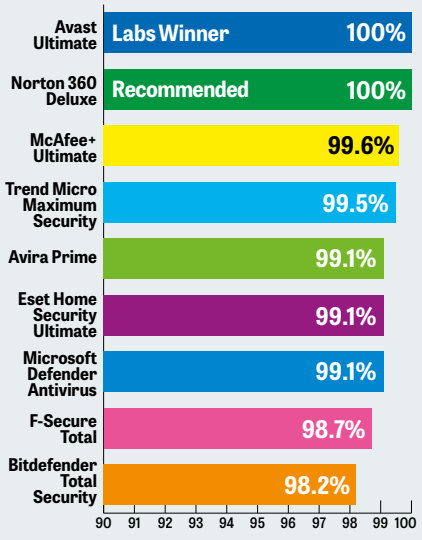
We also take into account performance impacts, measured by AV-Test, and false positive identifications of legitimate software and websites.

Protection

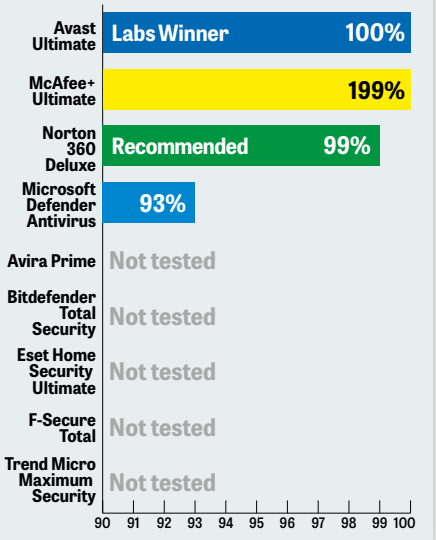
AV-Test real-world tests



AV-Comparatives

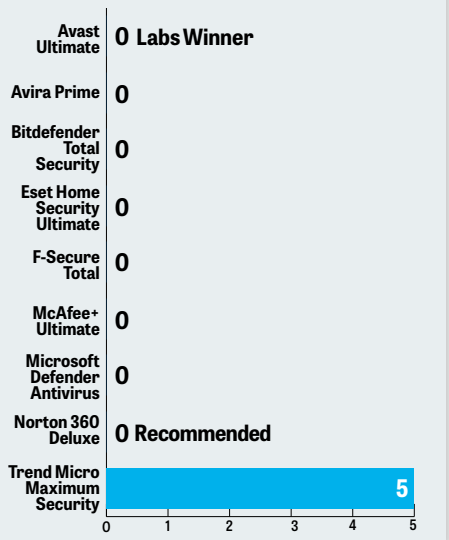


SE Labs

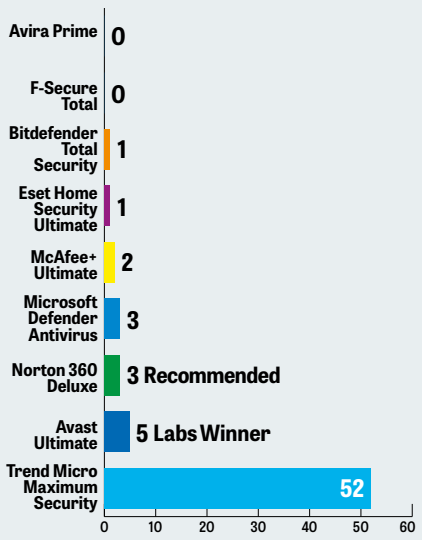


False positives

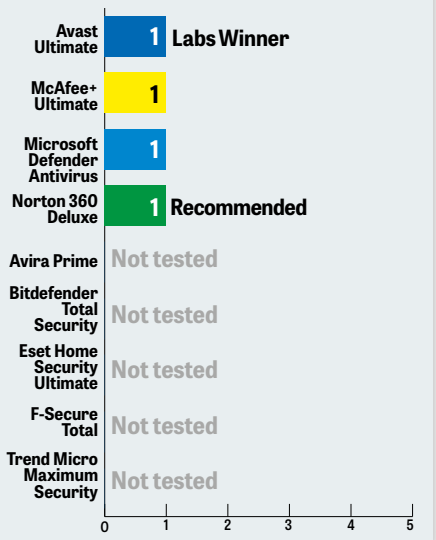
AV-Test real-world tests



AV-Comparatives



SE Labs



View from the Labs

Exactly how useful are the added extras found bundled with security suites?

Most top-of-the-range internet security suites offer a wide range of extra features that purport to keep you safe online, improve your PC's performance or enhance your privacy. But are these just value adds to increase perceived value or genuinely useful?

The current trend, which I've seen in tools such as McAfee Scam Detector, Norton Genie Scam Protection and Avast Scam Guardian, is to bundle an interactive scam and fraud detection tool with the antivirus suite. For now, these are often also available on the web or via mobile apps for free.

The tools typically have a ChatGPT-style interface that allows you to ask anything about the safety of software to the latest security tips. You can also paste in suspicious emails and images for analysis against a machine-learning engine tuned against a corpus of known scam content.

It's impossible to fully assess the accuracy of these scam detection tools, but the limited and predictable nature of scam emails makes their identification a likely candidate for machine learning. Something that's not clear, however, is the amount of power being burned in data centres running these chatbots. Thankfully, the chatbots' topics of conversation are tightly locked down to only respond to queries that directly relate to the software and topics they're authorised to speak on, and that should mean fewer parameters and thus fewer resources.

KG Orphanides specialises in security topics and provides a quarterly testing service of VPNs at vpndatatracker.com
@kgorphanides

Some of the most useful extra features you'll find in cybersecurity suites are virtual private networks. VPNs allow you to route your internet traffic via an encrypted tunnel that gives you an entirely different IP address and even geographical location. They're popularly used to prevent local network providers or ISPs seeing your traffic, evade national firewalls and content blocks, and region-shift to another country so you can watch British TV while on holiday abroad, or vice versa. While a few AV firms make their own VPNs – Avast, Norton and F-Secure come to mind – most re-brand white-label services from VPN providers such as Hotspot Shield or Windscribe.

"Password managers are also very common, but my position is clear: this tool should be kept separate from other subscriptions"

Password managers are also very common, but my position is clear: this tool should be kept separate from other subscriptions. Most password managers I've seen from general cybersecurity firms lack the detailed features you'll find from specialist password managers such as Bitwarden or KeePass, and who wants to switch password managers when they switch security suite provider?

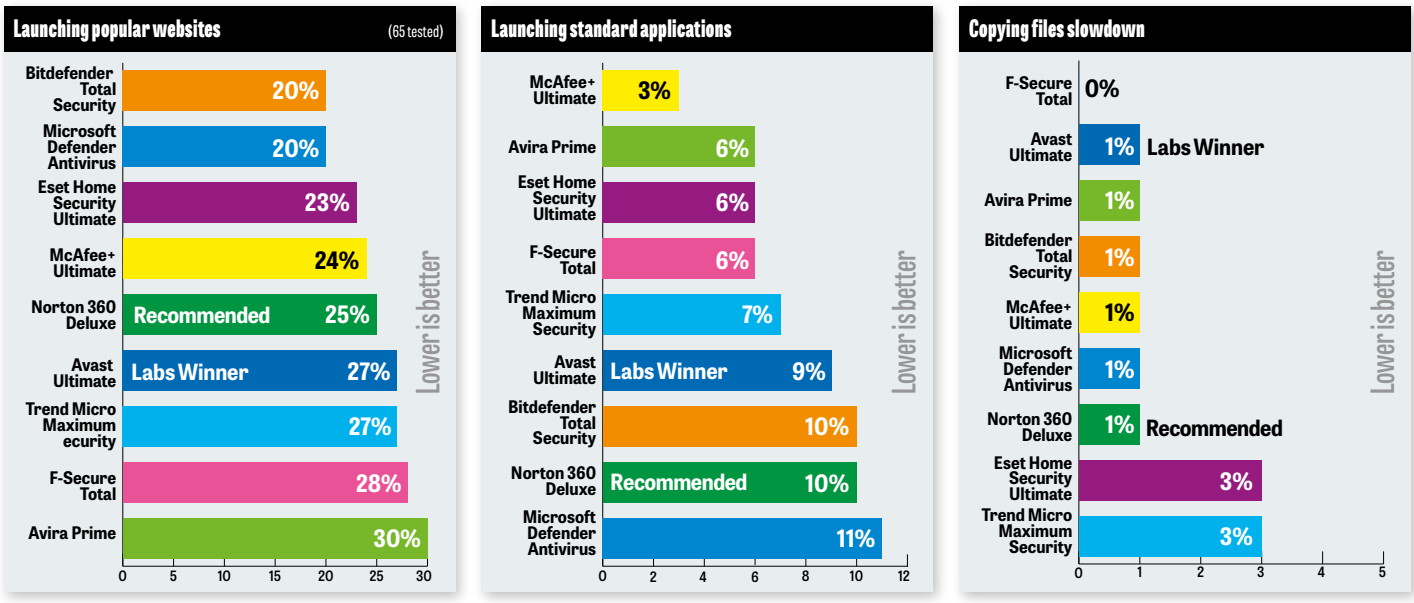
You'll also see a lot of Registry cleaners, disk space optimisers, software updaters, ad and tracking blockers, and browser extensions. These have been part of the security software landscape for years, and while they can be useful, they're unlikely to have a make-or-break influence on your purchase decision, as free and open-source alternatives are widely available.

Identity protection services are increasingly popular, with almost all antivirus providers now offering breach monitoring to alert you if your email address appears in any customer data leaks that appear on the dark web. However, that's a service you can get for free from **haveibeenpwned.com**. More advanced options include social media security analysis tools to help you control who can see your data on the most popular social networks, and full-on identity theft insurance if things go wrong.

It's worth bearing in mind, though, that if you don't actually want dozens of extra features and apps but simply need reliable real-time and on-demand defence against malware with a minimum of disruption or interaction, the lowest-priced product in any antivirus maker's range will do just that. This includes free software from Avast, Avira and, yes, Microsoft itself. However, that forgettable convenience is one reason why it's important to keep an eye on Defender's performance in tests to ensure that it's still delivering the kind of protection that you need. It's vital to remember that everything else is just an extra. ●

Performance

(AV-Test's measured influence on computer speed)


Launching popular websites
(65 tested)
Bitdefender Total Security 20%
Microsoft Defender Antivirus 20%
Eset Home Security Ultimate 23%
McAfee+ Ultimate 24%
Norton 360 Deluxe Recommended 25%
Avast Ultimate Labs Winner 27%
Trend Micro Maximum ecurity 27%
F-Secure Total 28%
Avira Prime 30%
0 5 10 15 20 25 30
Lower is better
Launching standard applications
McAfee+ Ultimate 3%
Avira Prime 6%
Eset Home Security Ultimate 6%
F-Secure Total 6%
Trend Micro Maximum Security 7%
Avast Ultimate Labs Winner 9%
Bitdefender Total Security 10%
Norton 360 Deluxe Recommended 10%
Microsoft Defender Antivirus 11%
0 2 4 6 8 10 12
Lower is better
Copying files slowdown
F-Secure Total 0%
Avast Ultimate 1% Labs Winner
Avira Prime 1%
Bitdefender Total Security 1%
McAfee+ Ultimate 1%
Microsoft Defender Antivirus 1%
Norton 360 Deluxe 1% Recommended
Eset Home Security Ultimate 3%
Trend Micro Maximum Security 3%
0 1 2 3 4 5
Lower is better

Buyer's guide

Protect your endpoints

Laptops, phones and workstations are often the weakest link in any business's defence strategy, so give them the protection they need. **Dave Mitchell** reviews four contenders

Endpoint protection is rapidly becoming one of the most critical components of a business data security strategy. Client devices such as workstations, laptops and mobiles are the weakest link as they can easily present entry points into the network that can be exploited by cybercriminals.

Today's geographically distributed workforces pose even more challenges as they go beyond the safety net of network perimeter security solutions such as firewalls and UTM appliances. Endpoint protection software can close these gaps by keeping users secure regardless of whether they're in the office, at home or on the road.

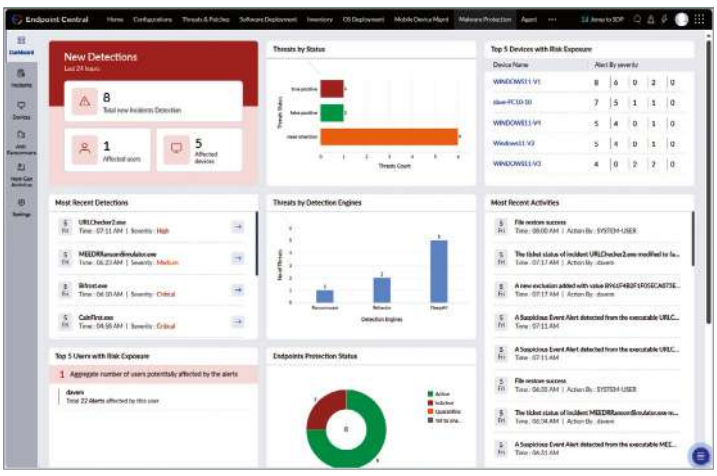
In this month's guide, we've reviewed business-class endpoint protection products from four of the biggest names in the industry – ManageEngine, Sophos, WatchGuard and WithSecure. All the products are ideally suited to budget-conscious SMBs, and we've put them through their paces in the lab to help you make the right choice.

Cloud connected

The four contenders in this guide were chosen because they're all cloud-hosted services. This makes them ideal for SMBs with limited on-site IT expertise: they're easy to set up, don't require any extra expenditure on hardware and can be managed entirely from a secure web portal.

Endpoints require an agent installed locally, and all good products offer options to download them from the portal, email a link to remote users or import users from identity management services such as Microsoft Entra ID and Active Directory. Cloud-hosted solutions work seamlessly with hybrid working practices as the agents take all their settings from the cloud regardless of where the endpoint is located.

Deployment is further simplified by the fact that the local agents are preconfigured for your cloud account and automatically register with it, so there's nothing users need to do. All cloud-hosted solutions include a default set of security policies that are assigned to agents when they first come online, so essential protection starts immediately.



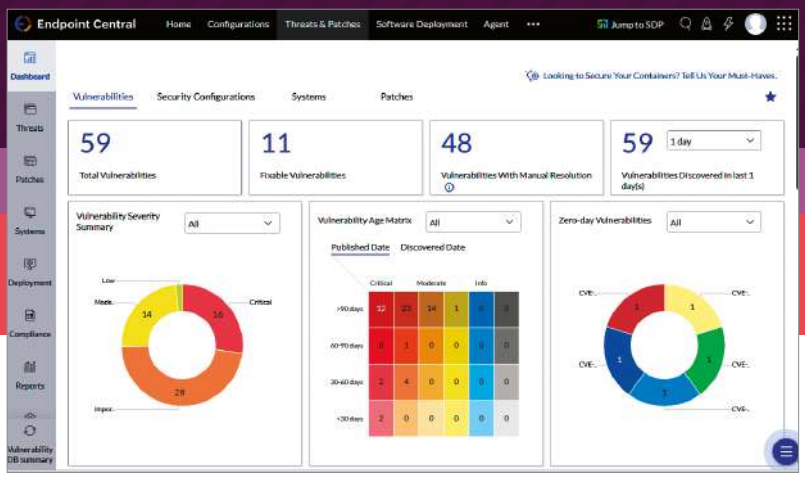
BELOW Endpoint Central provides a clear picture of detected threats and compromised systems

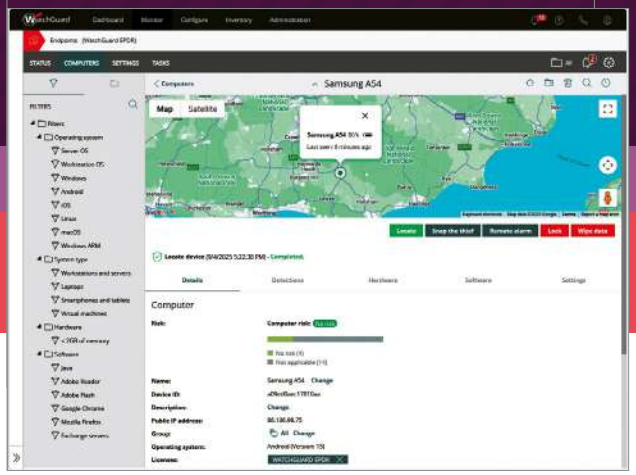
Policies are a powerful feature, allowing you to create custom profiles with groups of security settings. These can be used to apply a specific set of security measures to groups of endpoints, and products with anti-tamper settings can stop users uninstalling the agent.

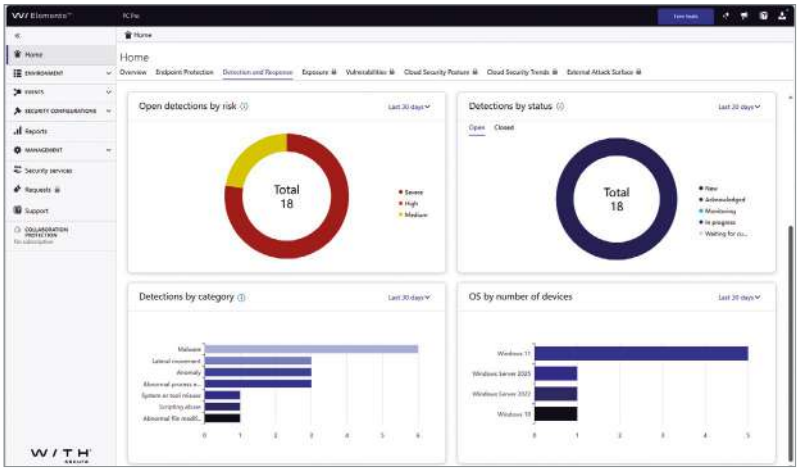
The use of GenAI apps raises many questions; there have already been numerous data breaches caused by their unmonitored use in the workplace, with the OmniGPT chatbot breach one of the most recent. Endpoint protection can help: features to look for are application controls that can be used to block these types of apps, and data loss prevention (DLP) to stop exfiltration of sensitive company information.

New zero-trust

Much as CrowdStrike would like you to forget about the catastrophic IT outage it inflicted on the







ABOVE LEFT Endpoint Central includes patch management and software deployment tools

ABOVE WatchGuard's EPDR provides strong protection for Android and iOS mobile devices

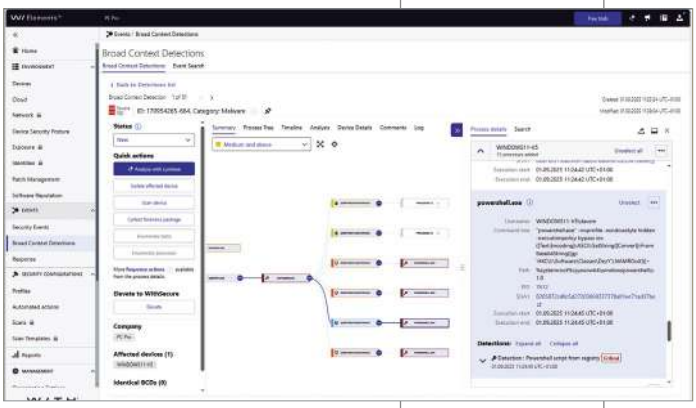
LEFT WithSecure's EDR dashboard highlights all the threats you need to know about

world in 2024, there are important lessons to take from this that are just as relevant now as they were then. Endpoint protection vendors promote a zero-trust approach to threat detection, and businesses need to apply this to vendors as well.

The outage was caused by an insufficiently tested software update to the Falcon endpoint protection agents that caused affected systems to crash – and there were a lot of them. To mitigate this, it would be advisable for businesses to conduct a risk assessment and implement testing processes of their own before allowing updates to be deployed to live systems.

Look for vendors that allow you to create different groups of endpoints and apply custom policies that ensure they receive updates first so you can monitor their impact before releasing them to critical systems. One vendor offers an option to create a security policy that receives early releases of agent updates and deploys them to a group of designated test systems.

Naturally, this will incur extra expense and manpower, but it means you can test them in advance of GA (general availability) to make sure they're safe before applying them to live systems. Another vendor on review offers staged update release policies so you can control when endpoints receive new packages.



ABOVE WithSecure's BCD feature provides a full analysis of suspicious events

The first stage is used for testing, the second is applied to non-critical devices, and the third stage is for business-critical systems. Of course, you could also ask your prospective provider how they test their updates – one vendor advised us they rigorously test all updates in a lab environment consisting of multiple donor systems at least four hours before GA.

EPP, EDR and MDR

When researching endpoint protection solutions, the two most common terms you'll come across are EPP (endpoint protection platform) and EDR (endpoint detection and response). The differences are quite straightforward: the first is mandatory and the second is optional and complementary.

EPP is your first critical line of defence and provides preventative security services to block common threats from your devices. Typical features include real-time antivirus scanners, ransomware protection, a client firewall and web content filtering. The more sophisticated products offer advanced features such as machine learning and behavioural analysis for detecting zero-day threats.

EDR provides extra layers of security on top of EPP and includes higher-level functions such as threat intelligence, forensics, event-focused alerting and automated responses to suspicious activity. EPP can't prevent every threat from entering the network, and EDR provides security teams with the tools to detect the more devious attacks, hunt them down, identify compromised endpoints and remediate them.

In today's rapidly evolving threat landscape EDR is fast becoming an essential feature, but smaller businesses that find this all too much can outsource all the hard work to their supplier. Look for a service called managed detection and response (MDR), as vendors that offer this will assign an in-house team of experts to monitor your endpoints, respond to cyber threats and remediate them for you.

"The use of GenAI apps raises questions; there have already been numerous data breaches caused by their unmonitored use in the workplace"

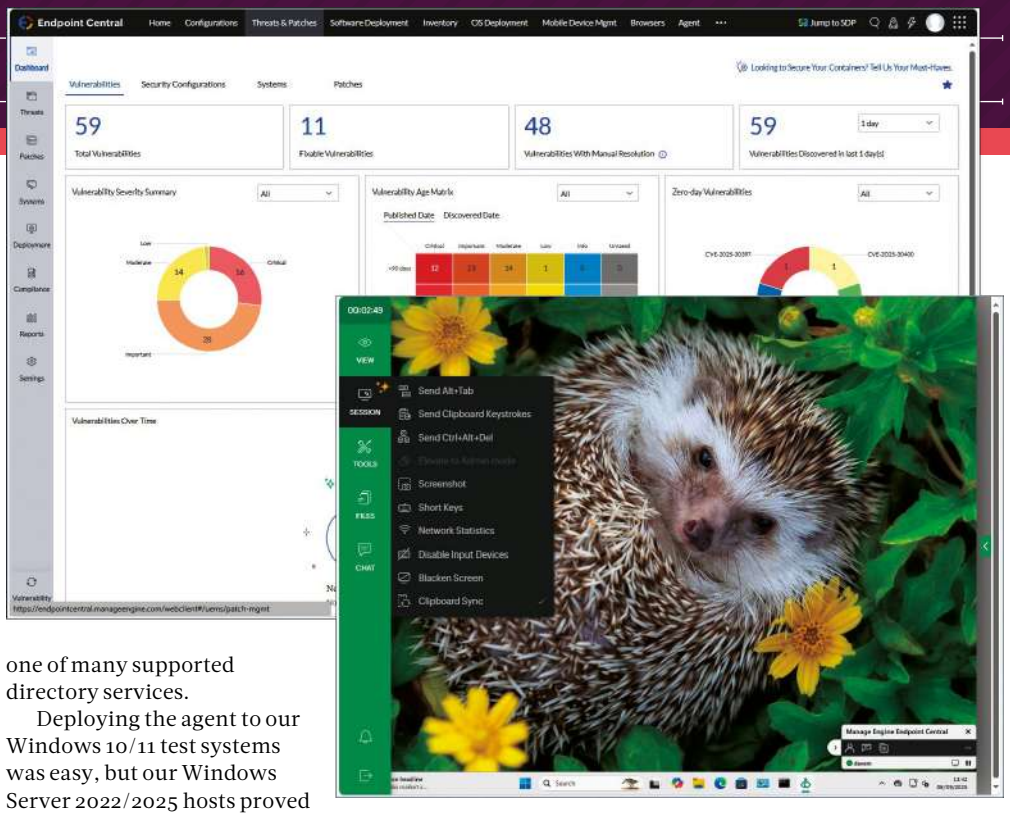
The sheer range of options makes it important to choose the right endpoint protection product to avoid any costly mistakes. The four products in this guide are all available as fully functional, time-limited evaluations, so you can try them out first to see which one best fits your business's security requirements.

ManageEngine Endpoint Central

Not the easiest to deploy, but Endpoint Central offers a wide range of services at a tempting price

SCORE ★★★★☆

PRICE UEM Cloud Edition, 50 devices, from £1,035 exc VAT/yr from manageengine.com



ManageEngine is a key player in the Zoho software and services empire and offers a host of IT management products. Its Endpoint Central is designed to provide a unified management, monitoring and security solution.

It's available in a range of licensing schemes, and you can choose either on-premises or cloud-hosted versions. ManageEngine offers a free version for 25 endpoints that enables everything Endpoint Central has to offer, and you can choose from four paid-for editions with differing levels of features.

And there are features aplenty, with the endpoint security module including antivirus, anti-ransomware, vulnerability detection, data loss prevention and removable device controls. Modules are also available for device provisioning, mobile protection, patch management, app controls and even remote support.

We opted for cloud hosting and the sheer range of features presented by the portal can present a steep learning curve. Fortunately, one endpoint agent is required to avail yourself of all features. This can be downloaded from the portal or distributed using the on-premises distribution server or one of many supported directory services.

Deploying the agent to our Windows 10/11 test systems was easy, but our Windows Server 2022/2025 hosts proved trickier. The malware protection module doesn't support Windows Server OSes and the portal will post an alert to this effect, but if you want all the other management features, you'll need to install them anyway.

The malware protection dashboard opens with a detailed summary of all detected threats and options to drill down for more data. The agents initially run in a passive audit mode; when you're ready, you can swap them all to the "Kill and Quarantine" policy and change detection sensitivity from standard to aggressive.

Along with machine learning behavioural analysis, the ransomware protection service uses Microsoft's VSS to take copies of files every three hours to a tamper-proof area on each endpoint. If a ransomware attack is detected, you can view the event and select the resolve option to roll back infected files to the most recent copy.

It also creates a honeytrap by placing three hidden image, document and text decoy files on the endpoints. If illicit encryption of these files is detected, the agent reacts immediately and sends alerts to administrators – we know this works as ManageEngine provides a simulator tool that encrypts them to test responses.

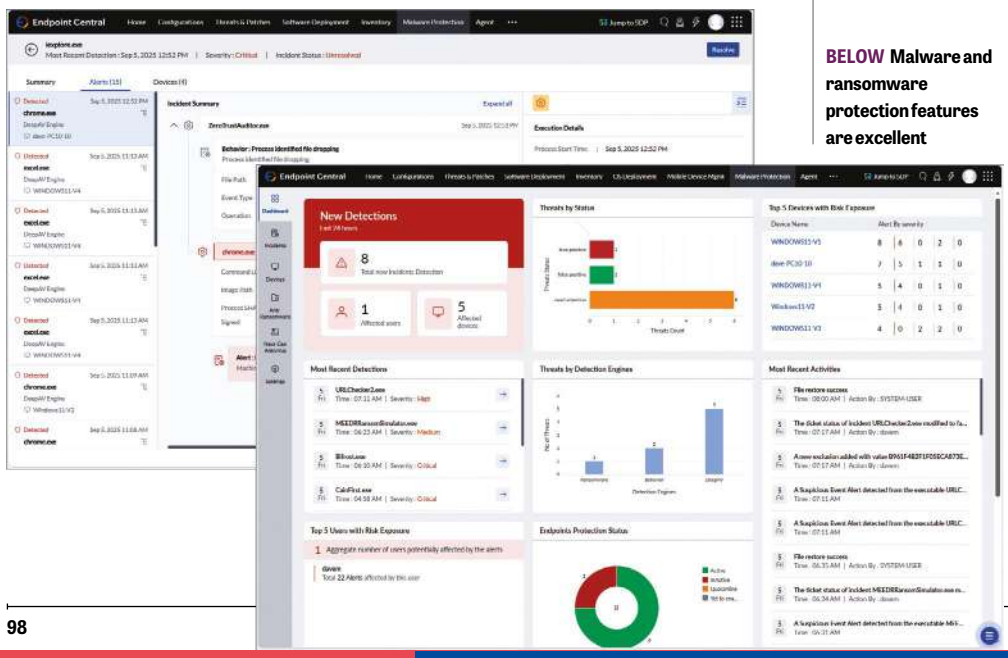
ABOVE Endpoint Central includes patch management and lots of remote support tools

Antivirus triggers check when programs execute, but you can also tell them to examine DLLs as they're loaded and scan files when they're written to. During our malware tests, we found it necessary to disable Windows Defender to stop it jumping in front of the agent, after which it subsequently detected all our samples and remediated them.

> **"There are features aplenty, with the endpoint security module including antivirus, anti-ransomware, vulnerability detection and DLP"**

The Browser module provides basic web filtering using manually created groups of websites and keywords, but for full URL category filtering you'll need the optional Browser Security Plus module, which requires its own on-premises server ,and a secure gateway server for managing remote endpoints. The UEM edition enables remote support tools including a system manager, remote shutdown services and facilities to run remote control sessions from the portal.

Endpoint Central has an impressive range of endpoint protection and management services, but you'll need to take your time choosing the right edition as there are a lot of optional add-on modules. Deployment can also be lengthy but you'll be hard-pushed to find an alternative that offers the same level of features at a similar price.



BELOW Malware and ransomware protection features are excellent

REQUIREMENTS

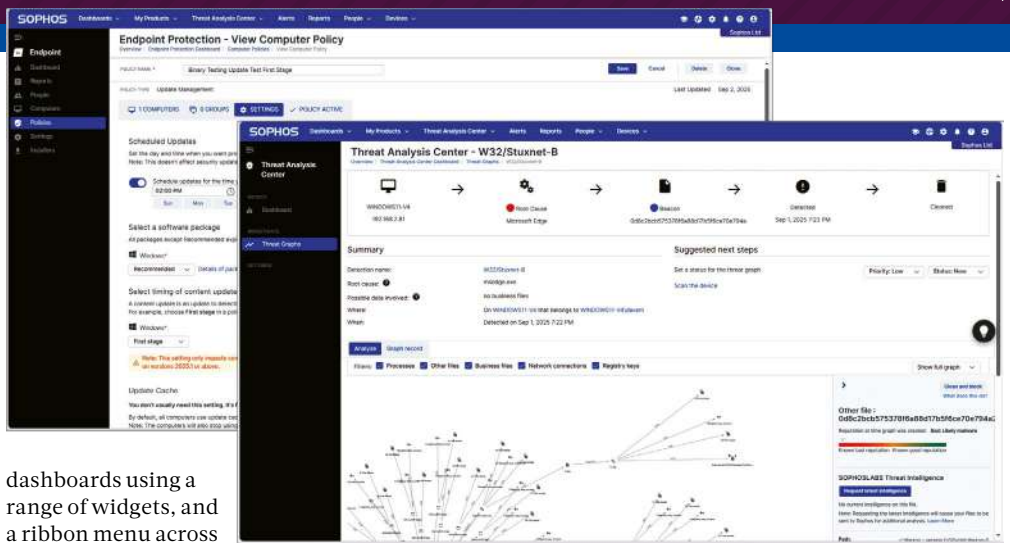
Agents: Windows 7, macOS 10.14 upwards • Server 2012 upwards (not malware protection) • Linux

Sophos Central Intercept X Advanced

Classy cloud-hosted endpoint protection with a wealth of features for the price and a brilliant management portal

SCORE ★★★★★

PRICE 50-99 users, £52.88 exc VAT each per year **from broadbandbuyer.com**



Along with its well-respected firewall appliances, Sophos offers an extensive portfolio of endpoint protection services, with the Intercept X Advanced on review delivering a complete workstation and laptop threat defence solution. Despite its name, the Advanced version is actually the entry-level offering in this family of three products, though a quick glance at its capabilities shows it is anything but.

Along with anti-malware, anti-exploit and web protection, it includes application and peripheral controls, data loss prevention (DLP), malicious traffic detection and an intrusion prevention system. AI-based deep learning gives known and unknown malware a hard time, and ransomware protection has a high priority as the CryptoGuard feature can roll back changes if malicious encryption activity is detected.

That's a lot to get to grips with but everything is rolled neatly into the Sophos Central web portal. Businesses heavily invested in Sophos will appreciate being able to remotely manage all their firewalls, wireless APs and switches from the same place.

The Central portal is well designed, with options to create custom dashboards using a range of widgets, and a ribbon menu across the top provides easy access to all products and services. The Endpoint menu opens with a dashboard showing your endpoint security posture, and deployment is swift as the Windows and macOS agents can be downloaded and placed in a central distribution point or installation links emailed to users.

Protection starts immediately, with each endpoint assigned a base threat protection policy with all the recommended security settings enabled. Other base policies are provided for web, application, Windows firewall and device controls as well as DLP, and you can use these as a basis for your own.

Most users will find the base protection policy provides everything they need. It enables essential functions such as real-time scanning, automated remediation, live protection – which uses the SophosLabs threat database to check suspicious files – AI-based deep learning and adaptive threat protection, which detects attacks and elevates endpoint security by blocking all potential threats.

CryptoGuard detects files being opened for editing, places a temporary clean copy in a proprietary cache on the client's local drive and, if malicious encryption activity is identified, it automatically rolls the file back to its original state. Acceptable web usage policies provide 48 URL categories to block or allow, DLP policies stop sensitive information such as banking details from being transmitted, and application control policies include around 2,780 predefined apps.

ABOVE Sophos provides policies for staged agent updates and an informative threat analysis service

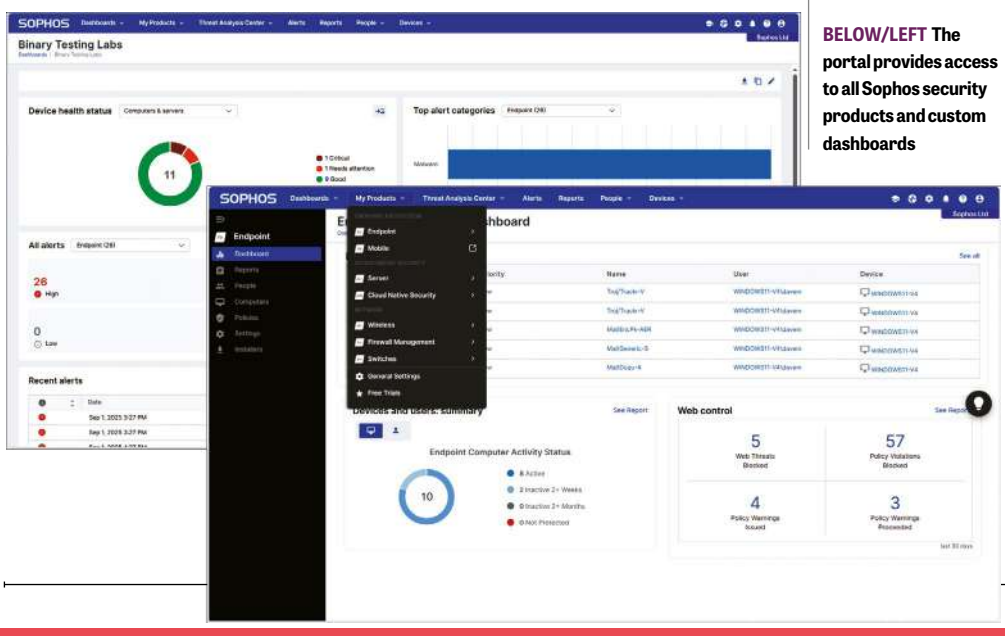
Sophos avoids alert smokescreens as it only posts warnings in Central's main dashboards and sends emails if an agent was unable to remediate threats. For all other non-threatening incidents, the reports section provides a wealth of information such as remediated threats, blocked apps, DLP policy violators and all web control events, blocked sites and the worst offenders.

> **"AI-based deep learning gives known and unknown malware a hard time, and ransomware protection has a high priority"**

The threat analysis service adds extra value, with its threat graph showing all security events. Selecting one provides a full analysis of all activity on the endpoint and a one-click option to clean up associated files and Registry entries.

Agent update releases can be tested prior to going live by enabling an option in the Software Packages menu to change their timing. This lets you create update management policies that determine when endpoints receive new packages, with the first stage used for testing, the second stage for non-critical devices and the last stage for business-critical systems.

Sophos Intercept X Advanced offers impressive endpoint protection measures, and the extensive range of security features included makes it comparatively good value. Protection policies add extra versatility and it's all easily managed from one of the best cloud portals on the market.



BELOW/LEFT The portal provides access to all Sophos security products and custom dashboards

REQUIREMENTS

Agents: Windows 10, macOS 13 upwards • Intercept X for Servers, Windows Server 2016 upwards, Linux • Intercept X Mobile, iOS 14, Android 7 upwards

WatchGuard EPDR

WatchGuard delivers tough, innovative cloud-managed endpoint security at a price that will appeal to SMBs

SCORE ★★★★★

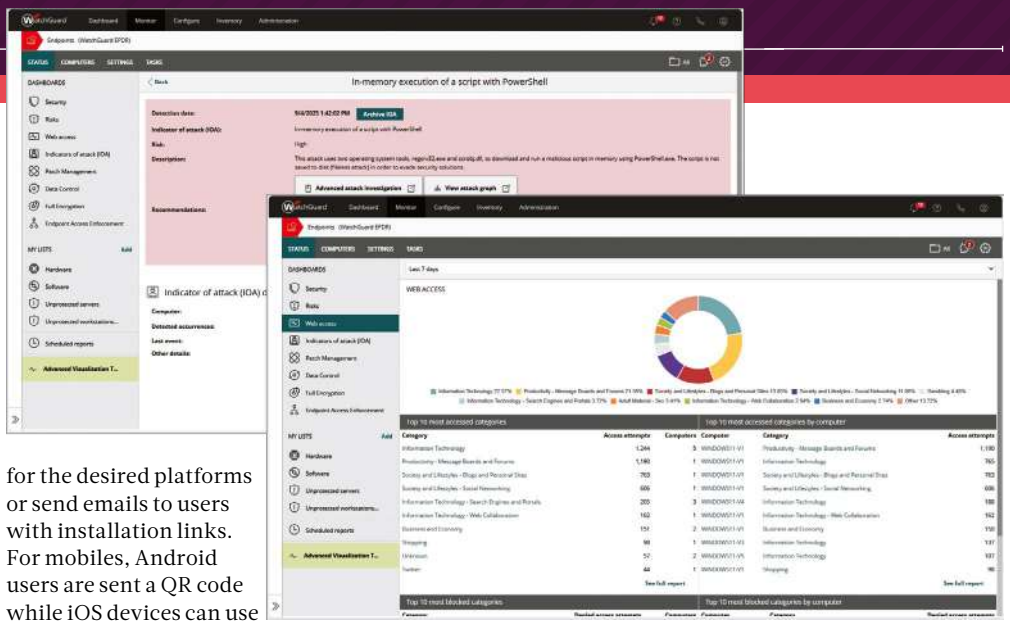
PRICE 101-250 seats, £37 exc VAT each per year **from broadbandbuyer.com**

WatchGuard offers a complete suite of endpoint protection solutions, and their modular design allows you to pick and choose the components you want. The family starts with the EPP (endpoint protection) edition, which includes virus, malware and exploit protection, web filtering and device controls, while EDR complements these with advanced threat protection plus WatchGuard's unique zero-trust application and XDR (extended detection and response) services.

The EPDR version on review bundles EPP and EDR into a single, more affordable package. Regardless of which module you choose, they're all remotely managed from WatchGuard's cloud portal, which is also used for its Firebox UTM appliances, Wi-Fi access points and ThreatSync XDR service.

Unlike rivals that offer separately purchased modules for server and mobile protection, WatchGuard's seat licences are universal. This will appeal to SMBs worried about extra costs as each licence can be assigned to any Windows, macOS, Linux, Android or iOS endpoint.

The cloud portal simplifies deployment: you download agents for the desired platforms or send emails to users with installation links. For mobiles, Android users are sent a QR code while iOS devices can use EPDR's integral mobile device management (MDM) server, a third-party MDM solution or a QR code.



A clever feature is that the first Windows system to receive the agent is promoted to discovery client status. It automatically lists all discovered LAN systems in the portal and you simply choose your targets and push the agent to them with one click.

Once agents have linked up with your account, they provide instant protection as each one is assigned to EPDR's default policies. These can be cloned and customised by defining functions such as firewall rules, active security services plus update frequencies, enabling advanced protection for app tracking, applying web content filtering and setting removable device controls.

The zero-trust application service comes into play with policies; initially, you set them to "audit" mode to passively gather information about app usage. A "hardening" mode allows unknown apps to run but blocks them from accessing external data sources, while the "Lock" mode should only be used after EPDR has been running for around two weeks as it blocks all further unknown apps until they've been evaluated by WatchGuard's lab technicians.

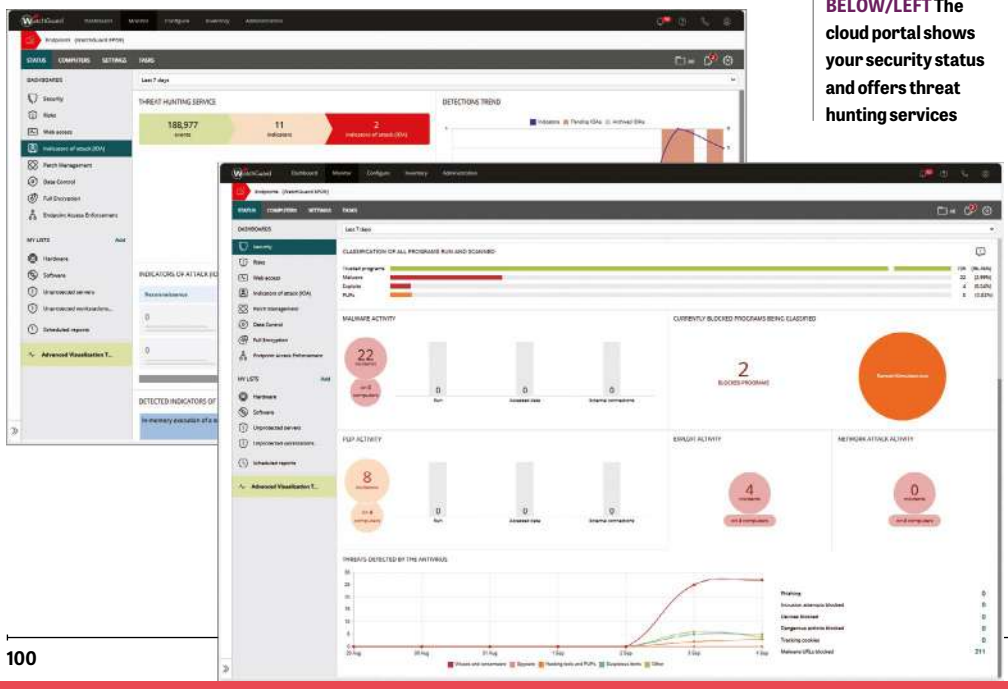
ABOVE **EPDR provides threat remediation advice and web content filtering**

PC PRO RECOMMENDED

Web content filtering uses the same database as WatchGuard's Fireboxes for consistency and now offers 126 URL categories that can be blocked or allowed. Program blocking is a manual affair as WatchGuard doesn't provide a list of common apps, so you'll need to add executable filenames to policies.

The portal status dashboard clearly shows your security posture, the risk display provides an in-depth view of all compromised endpoints, and the indicators of attack service shows you how threats developed and what you need to use to remediate them. Responses to suspicious activity are fast: when we ran our malware and exploit test suite on our Windows 10/11 and Server 2022/2025 endpoints, the agent blocked them all and posted events in the portal's security dashboard in a few seconds, with email alerts coming through within one minute.

"EPDR combines a deep set of endpoint protection services and presents them in a well-designed cloud management portal"



BELOW/LEFT **The cloud portal shows your security status and offers threat hunting services**

WatchGuard ensures agent updates won't cause mayhem as it advised us it tests them in a staging area four hours prior to release. Add the optional patch management module and you can also use policies to protect against dodgy Windows updates by running them on a set of test endpoints first.

WatchGuard's EPDR combines a deep set of endpoint protection services and presents them in a well-designed cloud management portal. The comparatively low subscription costs make it good value, and the price includes server and mobile protection.

REQUIREMENTS

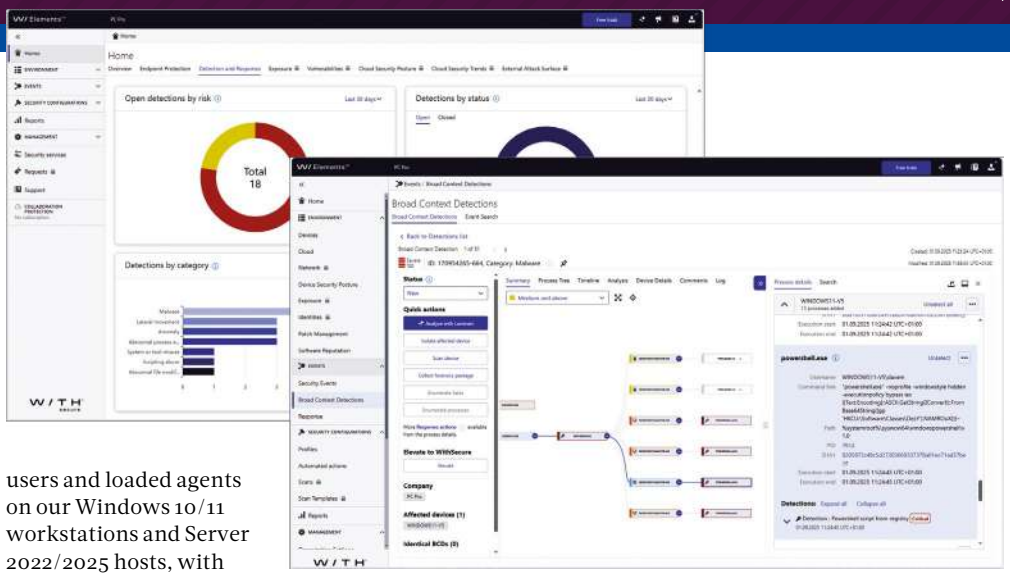
Windows 7/Server 2012, macOS 10.10 upwards • Linux • Android 5, iOS 13 upwards

WithSecure Elements Endpoint Security

Super-strength endpoint protection that's easily managed from a central web portal at a good price

SCORE ★★★★★

PRICE 100-499 workstations, £37 exc VAT each per year **from** withsecure.com



WithSecure offers an extensive range of data security and endpoint protection solutions, and its Elements Cloud service provides a single web portal to manage them all. The suite is also completely modular so you can pick and choose the components to suit your requirements and budget.

We review the Elements Endpoint Security (EES) component, which amalgamates WithSecure's endpoint protection (EPP) and endpoint detection and response (EDR) modules. Platform support is excellent as WithSecure offers modules for protecting Windows and macOS workstations, Windows and Linux servers and Android and iOS mobiles, and the base product includes patch management for Windows OSes.

The portal opens with an overview showing the status of protected endpoints and mobiles, software updates and open detections graded by threat risk. New features include simplified security event filtering and profile creation, more online help, options to trial other Elements modules, access to complimentary training courses and improved language support for the smart Luminen GenAI assistant.

Deployment is swift; we used the portal to send email invitations to our users and loaded agents on our Windows 10/11 workstations and Server 2022/2025 hosts, with the process taking around five minutes for each one to link up with our cloud account. Protection starts immediately, with preconfigured read-only security profiles being assigned to devices as soon as their agent has connected to the cloud portal.

It's simple to create new ones, too: we cloned the predefined ones, tweaked them to our requirements and assigned them to multiple endpoints. Profiles provide an incredible range of security features, with options for managing real-time malware scanning actions, determining when automatic updates occur and scheduling regular systems scans.

Profiles can block access to removable devices, while web protection includes reputation-based web page scanning, safe search enforcement and web content controls using a list of 33 URL categories. The EES Premium licence enables application controls plus WithSecure's DataGuard, which detects potential ransomware activity using behavioural rules.

Businesses worried about applying agent updates to live systems can rest easy as profiles include an early access option. Create a new profile with this enabled and assigned systems will receive all updates at least a week in advance of general release so you can test them before going live.

ABOVE Detections and responses are shown clearly and the BCD feature is now even easier to use

PC PRO A-LIST

"Platform support is excellent, the modular design makes it simple to customise, and it's priced right for SMBs"

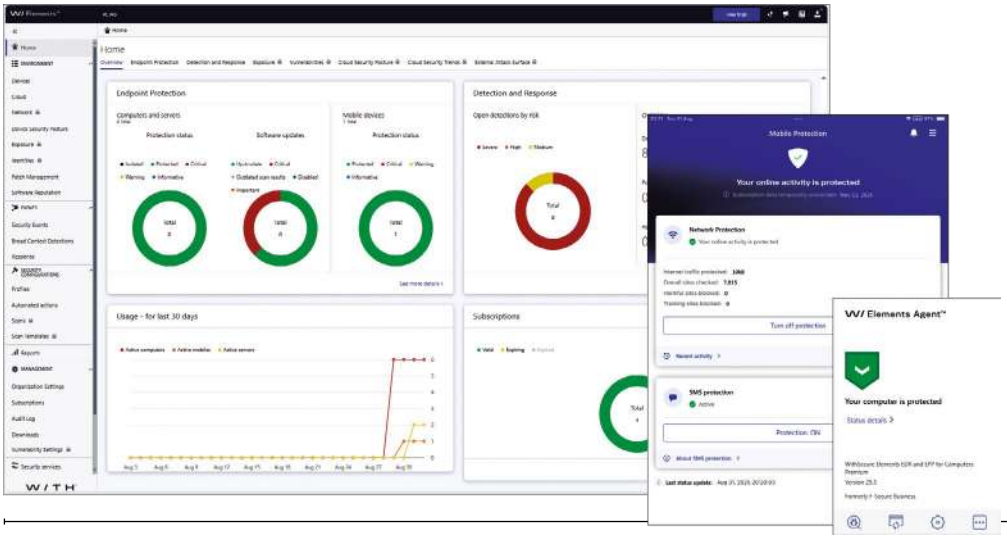
Mobile protection is equally easy to deploy. We simply sent emails to our iOS device users with a link to load the app and register it with our account. It automatically creates a VPN, and you can use custom profiles to enforce reputation-based web browsing controls, web content filters and anti-malware with the latest version adding SMS phishing protection.

All threats are presented in the security events page and WithSecure's broad context detection (BCD) provides more detailed information with a full analysis of suspicious events, an attack path visualisation and buttons to scan the offending endpoint and isolate it from the network. The Luminen GenAI service generates full summaries of selected events along with detailed explanations and remedial advice, with BCD now providing a timeline view of events, one-click access to device details and options to directly kill processes.

Valuable ransomware protection for Windows systems is provided by the Rollback feature, which can initially be run in safe mode where it only reports on unauthorised changes. Enabled in profiles, it tracks unclassified apps and if it doesn't like their behaviour, it shuts them down and rolls back any changes made to the Registry and files.

Elements Endpoint Security offers an impressive range of protection measures all centrally managed from a single web portal. Platform support is excellent, the modular design makes it simple to customise, and it's priced right for SMBs.

BELOW The Elements web portal provides an overview of all detected threats



REQUIREMENTS

Windows 10/Server 2016, macOS 13 upwards • Linux • iOS 15, Android 11 upwards

Dell PowerEdge T160

The perfect entry-level server for SMBs with a remarkable hardware spec and lots of storage surprises

SCORE ★★★★★

PRICE From £1,172 exc VAT
from dell.co.uk

ABOVE **An industrial-strength steel chassis protects the high-spec components within**

Dell has traditionally had a very strong presence in the entry-level server market, and the PowerEdge T160 stands out as one of the best solutions we've yet seen. It packs an incredible hardware specification into a superbly designed chassis, with this latest version supporting Intel's family of Xeon 6300 CPUs.

It's very affordable, too, with base systems offering a quad-core 2.8GHz Xeon 6315P CPU teamed up with 16GB of fast DDR5 memory. The T160 supports all eight models in the Xeon 6300 family, and although there's little to be gained you can also specify it with an older Xeon E-2400 CPU.

The T160 stands out from the crowd thanks to the silver zinc coating and targets "near edge" deployments as it's available with an optional bezel kit and dust filter. Build quality is outstanding, and although Dell claims the T160 is 42% smaller than the T150 it's replacing, the industrial-strength steel chassis weighs almost the same at nearly 12kg for a fully populated system.

Behind the sturdy steel side panel is a large plastic air shroud which encloses the motherboard and front drive bays and helps direct air flow from the single 9cm diameter rear cooling fan. The shroud is easily removed and underneath, you'll find a well-designed interior awaits.

The CPU is fitted with a large passive heatsink, below which are four DIMM slots that can handle the maximum 128GB of DDR5 memory supported by the Xeon 6300 CPU. Network connections are presented by a dual gigabit LOM (LAN on motherboard) controller, and there's room to expand further with two PCIe Gen4 slots at the top of the motherboard.

The majority of entry-level servers come up short in the storage department, but the T160 isn't one of them. At the front you have an internal cage for three cabled LFF hard disks, which can be easily released by undoing one thumbscrew.

Above the cage are two more bays with plastic carriers for SFF drives, with Dell offering a choice of SAS and SATA SSDs. RAID options start with the server's embedded PERC S160 controller, which supports software-managed stripes, mirrors, RAID10 and 5 arrays for SATA drives.

There are plenty of other RAID choices. The T160 supports Dell's PERC H355 card, which offers stripes or mirrors for SAS and SATA drives, or the higher-end H755, which enables RAID5, 6, 50 and 60 arrays. The non-RAID HBA355i adapter provides simple passthrough services for storage devices.

The T160 supports up to seven storage devices as there's room under the PCIe expansion slots for Dell's optional BOSS-N1 card. This presents a pair of M.2 NVMe SSDs in hot-plug carriers accessed from the rear.

The card is available with a choice of 480GB or 960GB NVMe SSDs, which can be mirrored, making it ideal for running an OS or hypervisor on a fault-tolerant array and keeping the other five bays free for data storage. Our review system has the extra high-performance fan unit fitted behind the upper drive bays. This increases noise levels but not so you'd notice in an office environment.

Dell scores more points for system management as the T160 comes with an iDRAC9 embedded controller and dedicated gigabit port. It may not be the latest version, but the iDRAC9 delivers everything a small business could possibly need; its web console is packed with valuable information about system and component status.

PC PRO RECOMMENDED

"The PowerEdge T160 stands out from the current crop of bland and boring entry-level servers and is ideally suited to small businesses"

The starting price includes an iDRAC9 Basic licence, which activates web access, hardware monitoring and remote power controls. If you want features such as virtual media services and full OS remote control, you'll need to upgrade to an iDRAC9 Enterprise licence.

The PowerEdge T160 stands out from the current crop of bland and boring entry-level servers and is ideally suited to small businesses. Build quality is beyond reproach, support for Intel's Xeon 6300 processors provides plenty of power, and it can't be beaten for storage features. **DAVE MITCHELL**

BELOW **The embedded LifeCycle controller simplifies OS installation and the iDRAC9 offers an informative web console**

SPECIFICATIONS

Tower chassis • 2.8GHz quad-core Intel Xeon 6315P processor • 16GB DDR5-4800 ECC UDIMM (maximum 128GB) • 3 x LFF and 2 x SFF cabled drive bays • embedded PERC S160 SATA RAID controller • 2 x PCIe Gen4 • dual gigabit LOM • optional Dell BOSS-N1 • 300W Bronze cabled PSU • iDRAC9 Basic • 133 x 333 x 409mm (WDH) • 3yr basic on-site NBD warranty

Zyxel XGS1935-28HP

A port-dense gigabit PoE+ switch with quad 10GbE uplinks, two management modes and a pleasing price

SCORE ★★★★½

PRICE £311 exc VAT **from** broadbandbuyer.com

Zyxel offers an extensive range of network switches and, after providing sterling service since 2022, its XGS1930 series of four switches has been replaced by the XGS1935 family. Aimed squarely at small businesses with big connectivity plans, the new models offer an equally good range of options and are available in 24- and 48-port versions, while all of them have a quartet of 10GbE SFP+ uplink ports.

You also have a choice of two PoE models, and in this review we look at the XGS1935-28HP. The series are all Layer 2 (L2) switches with "Lite-L3" capabilities that support static IPv4 and IPv6 routing, but not the dynamic routing offered in more expensive full Layer 3 (L3) switches.

Performance specifications are identical to its predecessor, with the switch offering a high-performance backplane capacity of 128Gbits/sec and forwarding rate of 95.2 million packets per second (Mpps). It presents 802.3at PoE+ services on all 24 copper gigabit ports and has a reasonable power budget of 375W – the same as the XGS1930-28HP.

The only changes Zyxel has introduced are aimed at reducing the switch's environmental impact. It has employed more energy-efficient components, resulting in an idle power reduction from 31.2W to only 15.9W and a maximum power consumption drop from 471W to 452.6W.

The new switch is also smaller than the XGS1930-28HP, with the chassis depth reduced by 60mm and the weight cut by 0.7kg. Other new features include support for energy-efficient Ethernet (EEE) and 4kV ESD/surge protection circuitry.

For switch management, you can choose standalone mode or move it into the cloud using Zyxel's Nebula Control Center (NCC) platform. The standalone web console presents four wizards for setting a default admin password, as well as SNMP community names and configuring security features, VLANs and quality of service.

The console provides plenty of detail on system utilisation, port and PoE usage and overall powered device (PD) power consumption. A side menu offers easy access to all configuration options, with L2 features including port-based and 802.1q VLANs, plus static and LACP link aggregation groups.

Security features are good: the switch supports access control lists, port security and 802.1x port authentication and can automatically move users with incorrect login details to a secure guest VLAN. All SNMP versions are supported for switch monitoring but, unlike Zyxel's higher-end switches, you don't get the internal sFlow agent.

ABOVE Zyxel's latest network switch comes with a choice of 24 or 48 ports

The power budget should be enough for most small businesses, but you can apply power priorities to each gigabit port. If the total power draw gets close to the maximum budget, those assigned a low priority will be switched off first.

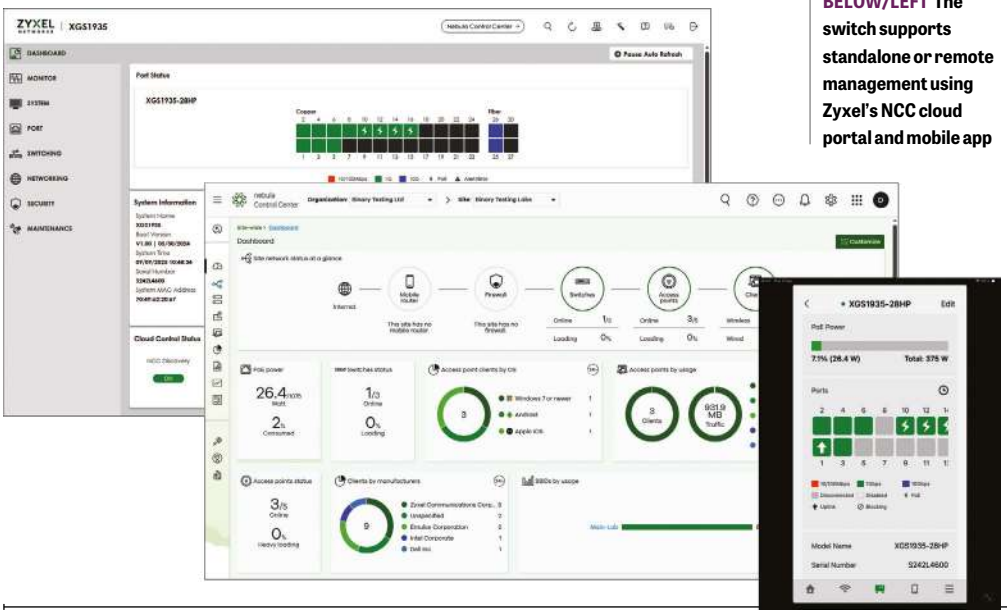
Adding the switch to our NCC cloud was simple: we used the Nebula iOS app on an iPad to scan the QR code label on its box. The switch then appeared online in our cloud portal in one minute and took all its settings from those we'd previously configured for the site.

The portal's monitoring page provides plenty of detail on the switch, with a colour-coded graphic showing each port's connection speed and those that are supplying power. Further down are 24-hour traffic graphs for the switch's uplink port, along with total power consumption. These are extended to seven days with an optional NCC Plus licence and one year with the Pro version.

"The portal's monitoring page provides plenty of detail, with a colour-coded graphic showing each port's connection speed"

For general switch operations, all features available in standalone mode can be accessed from the portal, which include options to set up voice VLANs, port mirroring, QoS services and aggregate up to eight ports in an LACP link. You can set port PoE priorities, use one of five global PoE schedules to determine when PDs are active, and enable and disable PoE services for remotely rebooting unresponsive PDs.

Costing only a shade over £300, Zyxel's XGS1935-28HP is a good choice for small businesses seeking a port-dense gigabit switch with PoE+ services. It's easy to deploy, the four 10GbE fibre ports add extra value, and it supports standalone or cloud management. **DAVE MITCHELL**



BELOW/LEFT The switch supports standalone or remote management using Zyxel's NCC cloud portal and mobile app

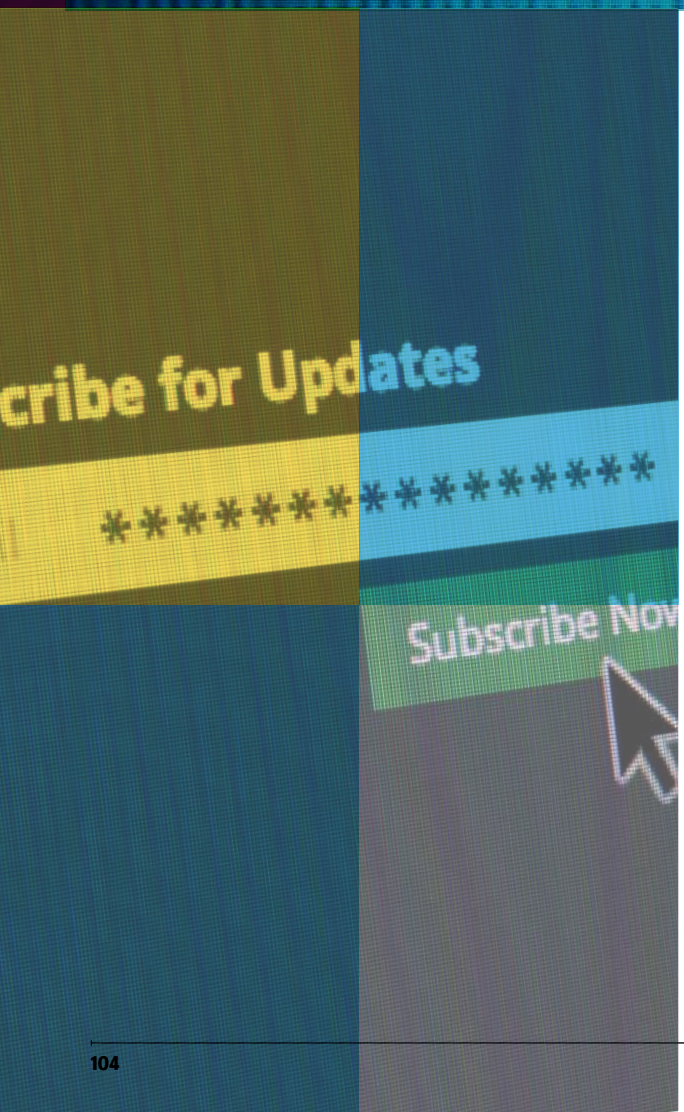
SPECIFICATIONS

1U rackmount chassis ● 24 x gigabit/PoE+ ● 4 x 10GbE SFP+ ● 375W power budget ● 128Gbits/sec backplane capacity ● 1.5MB packet buffer ● 16K MAC addresses ● internal PSU ● web browser and Nebula management ● limited lifetime warranty

THE SUBSCRIPTION TRAP

Take charge of recurring costs

Subscriptions and service contracts can bleed your business dry. Steve Cassidy shares practical advice on managing the budget



If there's one aspect of IT management that ticks me off, it's the weird world of subscriptions. I'm frequently amazed by what businesses will tolerate when it comes to restrictive contracts, and by the lengths suppliers will go to in order to lock you into their services. This month we'll look at some warning signs that you're about to be snagged in a situation without an easy exit – but first, I want to make sure you understand the scale of the risks we're talking about, and to do that we need a quick diversion into the world of non-IT contracted services.

That might seem outside of our remit, but my intention is to illustrate an important point. Part of the appeal of subscriptions is that they do away with big one-off purchasing costs; the trouble is that in place of that one expense, you're taking on a never-ending commitment. Your fortunes might change, your budget might shrink, but you can't take a payment holiday. The commitment and renewal model are enshrined in the contract, and if you try to wriggle out of them, you're not just going up against a supplier: you're putting yourself on the wrong side of the entire legal system.

This isn't to say there's no possible way out. I've seen instances of customers in difficult straits simply refusing to continue paying, and the supplier deciding that enforcement of contract would be more damaging to their reputation than pursuing the matter. Reputation matters, which is why we have to think about different legal specialities when considering what to do with a restrictive or sneakily worded contractual obligation.

But there are also plenty of instances in which a nasty contract has threatened the ongoing viability of a business. For many years, the market for business equipment such as phone systems, photocopiers, company-issued mobile phones and so forth has operated on a subscription-plus-consumables basis. Quite often the contract is carefully tuned to look cheap up front, but to work out considerably more expensive once the consumable portion has been added in. And once you're committed and settled on a system and a supplier, they have every incentive to squeeze the terms of the deal so that each year, terribly sorry old boy, but you didn't make enough calls to qualify for our top discount rate, so just use it all a bit more next year and then you'll benefit from the rates we tempted you with when we were signing the deal.

The cloud, and greed

Cloud sales pitches – if they talk about financing at all – tend to focus on the benefits of tapping into the operations part of the budget, rather than the capital part. Hooking the revenue stream to the amount of business done by the customer is a great idea for the supplier, because the purse strings for operational expenditures are generally a lot looser than the restrictions clenched firmly around the capital expenditure process.

Enough accounting-speak: at a technical level, the cloud-computing relationship is based on assumptions about the price and speed of kit bought with shareholder's money, versus the cost of having someone else do the capital expenditure, and popping up now and again to burn their watts, not your own. The trouble with assumptions is that they can turn out to be very wide of the mark, depending on precisely where your business ends up tomorrow, or in six months' time.

How much this matters depends on the particulars of your contract and supplier, with the purer website-oriented providers being among the more lenient. Conversely, I'm sure we can all think of a larger cloud provider who charges extra for each fragment of resource, from an IP address through storage, storage transfer, storage backup and even system updates. But they're big enough that I'm going to play it safe and not name the greedy party.

So, how can you avoid getting trapped – or recognise when you're stuck in an exploitative relationship?

1 Look out for monopolies

It's wonderful, I'm sure, to exploit cloud-based giant-machine AI, but when one specific product becomes a household name, that's a sign that you should be scoping out competitors and pricing up the costs of migrating. A big-guy, headline-stealing monopoly can afford to charge a premium on the back of its reputation, and may even start ramping up prices in ways that entitle you to break the contract. I've seen instances where a five-year agreement has been abandoned at year three because the deal on offer had changed so much from the original terms.

Haggling over terms before signing a contract is entirely legitimate

BELOW Don't be afraid to challenge and rewrite contract terms

Even if the pricing remains stable, keep an eye on the way the technology evolves with the market. There's a widening boundary between "LLM" AI – that is, 5,000 servers in the cloud – and machine learning, which condenses the derived wisdom of the former into one little chip mounted on a USB peripheral or in an expansion card slot. There are tipping points where you don't need to keep leasing yesterday's cutting-edge technology because it suddenly becomes today's cheap commodity.

2 Take a highlighter to contract discussions

When the contract paperwork arrives all neatly printed out in black and white, it may look authoritative and immutable, but it's nothing of the sort. You're completely free to cross out any sections you don't like, add your own and generally rewrite the language. Just because these are called "standard terms and conditions" doesn't mean they're the only ones the supplier can accept. Sure, the other party isn't obliged to go along with your modifications, but that's fine: they just lost the job.

The important thing here is not to be too timid. Haggling over terms before signing a contract is entirely legitimate (as opposed to breaking them afterwards). It's quite common for clauses to be disputed, compensation demanded and even for the whole thing to end up in court – and the parties still end up working together.

3 Capitalise on the power of your diary

Contract renewal time is a crucial period in any ongoing relationship. This is the supplier's opportunity to raise the price and reduce the service, if you let them. At the very least, they'll want to ensure your subscription continues, so look out for sneaky auto-renewal clauses. These may include a short cancellation period, with little or no notice, so if you're not on the ball you'll find yourself locked in for another year or three through mere inertia.

In many cases, continuing the relationship is in fact the right choice for your business. But putting a note in your diary three months before the anniversary comes around gives you a chance to evaluate your needs, check out the competition and put together the beginnings of a migration plan, should one become necessary. This doesn't only ensure you avoid being bounced into an unwanted contract, it puts you in a strong position for any contract renegotiations.

By the way, don't skip the important step of re-appraising your needs. Some contracts in IT assume a fixed population of users and machines, which the last half-decade has been shown to be an utter fantasy. The whole point of the cloud is that it's supposed to be flexible; if it doesn't let you revise your demand or number of users, it's not really doing its job.

4 Be cautious of bundled deals

Getting your antivirus product from the same company that provides mobile phones can seem like an appealingly simple and efficient deal. But bear in mind that the lifecycle of one product isn't going to march in lock-step with the other. Most people want a phone update around every 18 months, which isn't even slightly close to the renewal interval of a laser printer, VPN app or salon-quality hair dryer (yes, seriously). If you're tempted by a considerable saving over RRP by way of a bundle with a separate device or investment, think about how much it will cost to extricate yourselves from two business services at the same time, including the cost of standing up their replacements. Even a few minutes of calculation can show that the "hot deal" isn't anything of the sort.

5 Who owns whom?

Resellers provide a valuable human interface between your business and a monolithic developer or wholesaler. However, you're taking a risk if you agree to a long-term subscription to a product or service that isn't actually under the control of the vendor sitting across from you during the negotiations. I've seen this with corporate antivirus products: some well-known packages are actually just reskins of the same underlying engine, yet you may have no control over when and how you have to switch from one security platform to another. It creates a bit of a bump in the carefully budgeted annual plan for IT projects when internal support staff are obliged to drop everything and go around the offices tearing out the old app and

rolling in the new, bargaining for machine access person by person.

In a perfect world, of course, this shift of package would have been scripted by the vendor and kicked off automatically, but that's not usually something a reseller can offer.

There's also an important extension to this principle: who's running what for whom? Cloud portability is a fairly ordinary idea within the host and cloudy business sectors, but when your cloud partner actually tries to pick up and shift your VMs to a whole new data centre, you may run into scenarios that aren't mentioned anywhere in the service contract. For example, your cloud-resident workloads could be moved from a high-performance server farm to one that's not so fast. The supplier saves money, and of course none of the saving is passed onto you.

resolution team. A lot of credit-card purchases have the look and feel of regular consumer transactions, but carry the weight of hefty business contracts, so it really pays off to maintain some legal resources on your side to review all online purchases, even ones made by the most junior guy on the team. Not with a view to banning them, but just to get ahead of what the contract terms look like, and how easy it might be to cancel the use of the app and any associated payments.

Ideally, find someone who knows that PayPal repeating payments are harder to cancel than a whole credit card, and who has experience of spending time on the phone without losing the will to live. Don't expect everybody in the business to be individually clued into subscription rules.

SPV as a defence against the subscription trap

If you're not familiar with the term SPV, that's fair enough – it's a term from outside IT. It expands to "special purpose vehicle", and usually refers to isolating some business activity inside a shell company that can then enter into a potentially risky contract on behalf of a parent company. The SPV has no active buwsiness of its own: it exists merely to legally own and operate a particular contract or investment. While you can't simply escape a contract by winding up an SPV, you can use one to limit the exposure of the parent company's employees, assets and inventory.

IT and technology markets in general have yet to really embrace the idea of SPVs, but they can provide valuable insulation against the risk of subscription-model services or assets going bad. You might think of them as analogous to a virtualisation strategy, but applied to businesses rather than machines.

LEFT Employees may sign you up for all sorts of unbudgeted-for subscriptions

From worst cases to best practices

That's the warnings and cynicism out of the way – but if you're contract-savvy, there are things you can do to help yourself on the way into a service or relationship.

1 Focus your expertise

When a member of staff uses the company credit card to sign up to a service from an online app store, that creates certain obligations – but it doesn't mean your whole business needs to reorient itself to follow the rules of the store, or the software. There are ways to evade would-be subscription traps, such as using a low-limit credit card. Failing that, a card that's been hooked by a persistent subscription fee addict can be cancelled altogether. A quick call to the bank and a swift carpeting for the staff member and all the contracts in all the world can't ruin your day – at least not without ruining the days of the user and the supplier both, and where's the sense in that?

Focusing your expertise also means putting together a dispute-

2 Get ahead of subscriptions

One reason why app-store subscriptions are so popular is that they're quick and easy – you can find what you're looking for, sign up in an instant and be using the service a minute later. This convenience, however, doesn't necessarily ensure diligent business decisions. Getting staff to think in advance about app-store budgets does absolutely no harm; such conversations can serve as early warning mechanisms, and can help all parties to avoid the "cloud adoption curve" – in which a hot new tool spreads through the business like wildfire for 90 days or so, until the credit-card spend works its way through to the accounts department, leading swiftly to the abrupt withdrawal of all methods of payment available to the digital rebels on the shopfloor.

3 Share horror stories

A lot of people assume, on some vague level, that all payments and money transfers are covered by familiar consumer-type purchase protections. It's important to let them know this isn't always the case. I'm not talking here about ransomware scams where costs run into the tens of millions; rather, I'm thinking about cases like that of the cabbie who bemoaned his fate to me a few years ago. An apparently legitimate subscription had quickly turned into a series of massive automated payments that emptied the family accounts – and when notified, the bank certainly didn't wave a magic wand to reverse their losses in a flash. Instead, they sent round a loss adjuster to take a long look at the family laptop and decide whether they had taken reasonable precautions against being ripped off by repeating payments.

It only takes a couple of stories like this to help employees appreciate the work done for them by central IT resources, both accounting and legal.

If you're contract-savvy, there are things you can do to help yourself

In this area, as in so many, you have to work with the world as it is. Apps and subscriber services are cats way out of the bag, and banning them completely isn't realistic for most businesses. The most effective strategy for keeping a handle on money spent this way is to reassure people that they won't get fired for ill-advised sign-ups, and instead encourage them to be transparent about their transactions. An open door will catch far more drains on the business finances than a policy of enforcement and punishment. Much of the danger of the subscription trap comes from individuals and departments not wanting to reckon with what they've signed up to: get the information flowing freely and the trap loses much of its power. ●

Subscribe

Carbon-aware computing

Some workloads are energy intensive – but as Steve Cassidy finds out, there are greener and cheaper ways to operate

"Carbon-aware"? What does that mean then?
Just for once, it's a fairly clear and helpful term, referring to how green your computing activities are, in terms of what sort of power they're using. The underlying idea is to power everything from renewable energy sources, so far as possible.

How do we do that? Our electricity all comes out of the same sockets.
The easiest way is to schedule your workloads to run at "green" times, when the national grid is mostly powered by clean energy. Your power supplier can tell you when these times are; in the UK, they're usually in the dead of night. Although solar panels naturally aren't much use after sundown, wind generation can be most effective in the cool night air – and because overall demand is at its lowest in the small hours of the morning, there's a good chance that your power needs can be met entirely from renewable sources.

It hardly seems practical to do all of this when no-one's in the office!
A great many businesses run very smoothly on an end-of-day batch-processing model. Apart from anything else, doing it this way means your servers and network won't be overloaded when you're actually there interacting with them.

Alternatively, if a task runs in the cloud then you can simply move it to whatever region has the cleanest, greenest energy at that particular moment. There are several data centres in northern Europe that run entirely on wind and hydroelectric power, while in Australia and central Spain the blazing sun makes solar power a major component of the daytime energy mix.

Doesn't this raise data sovereignty issues?
Not necessarily. Sovereignty is certainly a concern for those who want to upload sensitive data such as customer lists and transaction summaries to cloud-hosting locations. But the tasks that benefit most from a carbon-aware approach aren't usually simple database operations; they're compute-intensive, number-crunching workloads, and these don't need to contain personal information. Indeed, if the quest for cleaner energy helps you identify areas where customer data can be stripped out of a workload, and better contained in a more secure environment, that's a good thing in itself.

Will this save us money or is it just theoretical good citizenship?
The goodness bit isn't theoretical. IT power consumption was racing off the charts even before the big cloud houses started building their AI-ready data centres. Your business might seem tiny in the grand scheme of things, but it can be part of a global movement that makes a real difference. At the same time, carbon-aware computing isn't a purely philanthropic idea: moving a big chunk of your power consumption to off-peak times can also have a very positive effect on your energy bills.

How do we prove to customers that we're actually being green?
There are a few different certification initiatives – green stamp logos and the like – mostly presented by local government agencies. The ISO also has a double-handful of standards you can attempt to follow. I'd expect that market pressure will pretty soon serve up some sort of standardised system for reporting resource usage across the entire commercial process, so environmentally aware consumers can be fully informed about how green the competing suppliers are – creating yet more of an incentive for businesses to be carbon-aware. ●

Shifting vs shaping

Moving workloads to the middle of the night – or migrating them to regions where it's currently the middle of the night – is sometimes referred to as "demand shifting". You don't change what you want to do, you're just changing the when and where. Another way for businesses to reduce their reliance on non-renewable energy is via "demand shaping", where the operations themselves are adapted to suit the time of day.

A simple example of demand shaping is configuring local servers to run in low-power, low-performance mode during the day. This means office workers can still use services interactively – they just might have to wait a bit longer for results. Media servers might be configured to provide low-resolution placeholder images during periods when energy is more costly.

Demand shaping is already built into many processes. For example, Windows defaults to installing urgent security updates at the first opportunity, while regular OS updates are downloaded and applied overnight. This isn't just to avoid interrupting the user's working day – it also means there should be more network bandwidth available, and the energy consumed in installing the update will be greener.

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Real world computing

Expert advice from our panel of professionals

JON HONEYBALL

"I had some specific technical interest in the new iPhone. So a small shopping accident occurred"

Never mind the iPhone 17 Pro Max he's just bought: it's a foursome of Ubiquiti NAS drives that sets Jon's pulse racing, along with a trip to a car-racing track

It's been quite a bitty month. The trip to Berlin for IFA (*see issue 374, p26*) put a small crater in my workflow, so I've been busy catching up with various projects to ensure they're delivered on time. But the late summer lull in IT news appears to be over, and vendors are moving full steam ahead.

One of the biggest sources of news came from Apple, with its annual iPhone refresh to kick things off. I decided to upgrade my trusty iPhone 16 Pro Max to the new 17 version. This isn't an upgrade I'd necessarily recommend, as usually a two-generation change should be considered the minimum. However, I had some specific technical interest in the new version, especially around its updated cameras and the Wi-Fi/modem chipset. So a small shopping accident occurred. I say "small", but I decided to go for the 2TB version this time. I didn't manage to max out the 1TB on the 16 Pro Max, but it's always good to have a little storage headroom. At least that was the justification to myself.

Transferring from the 16 to the 17 proved smooth once I kicked both into submission. There has been a very early release of a patch for the 17 Pro Max, and this needed to be installed before both phones would see each other and start the over-the-air transfer. This time it automatically converted the physical SIM in the 16 into an eSIM in the 17, so I didn't even need to get the poking tool out to transfer the prehistoric small sliver of plastic to the newer phone.

Once installed, I had to go through the rather boring process of re-authenticating my Office 365 accounts – I have no idea why this can't be securely transferred. I can understand why I needed to authenticate the credit cards in my digital wallet for somewhat obvious reasons. The Barclays app switched over very quickly, using a QR code generated by the app on the 16 to authenticate the app on the new 17.

The process transferred my Watch Ultra 2 across as well, and even my Dexcom G7 live continuous glucose monitoring kicked into action once the 17 decided it needed to do a Bluetooth pairing to the sensor.

So, overall, a simple enough process, even though it took the best part of an hour or more to transfer everything wirelessly across and set up the appropriate accounts so that all the cloud stuff (photos, etc) could be pulled down in the background.

Jon is the MD of an IT consultancy that specialises in testing and deploying kit
@jonhoneyball

BELOW My new iPhone has arrived and is all set up – unlike my new AirPods

AirPods Pro 3 ne parle pas français

If you heard restless sounds during September that was me waiting for my AirPods Pro 3 set to arrive. As I cover in my review (*see p74*), its most interesting new feature is live translation. This achievement isn't new – various companies offer this as a product. The issue is that this sort of capability has to be baked right down into the operating system, not ring-fenced into an app.

However, Apple's live translation won't be available in the EU for the time being. It isn't an issue of data protection to the cloud; all of the translation work is done within the phone itself. No, the problem is that this has become functionality in the OS, and that third-party headphone vendors might then demand access to the same capabilities for their own products on the Apple platform. And Apple, not without some justification, believes that this work is part of its own unique platform. The EU will probably disagree.

Until this is cleared up, the live translate feature won't work for EU-registered devices, but will do for UK-registered devices, as I share in my review. But will it work in Europe? I look forward to finding out when I travel to see our colleagues on the mainland.

New UniFi NAS

Entirely as I predicted, Ubiquiti has come up with a

Jon Honeyball
Opinion on Windows, Apple and everything in between – p110

Lee Grant
Tales from the front line of computer repair – p113

Olivia Whitcroft
Lawyer Olivia offers legal advice for the tech industry – p116

Davey Winder
Keeping small businesses safe since 1997 – p118

Steve Cassidy
The wider vision on cloud and infrastructure – p120

second generation of its UniFi NAS devices. My prediction was somewhat wrong, however, in that I thought it would "NASsify" the existing hardware that's used for its security camera storage platforms. Which is, after all, essentially what Ubiquiti did with the first generation UNAS Pro.

However, I was wrong. There's an entirely new line of hardware, and this is most definitely Generation 2. There are two desktop models, and two rack mounts.

On the desktop are the UNAS 2 and UNAS 4 models, costing £191 and £360 each inc VAT. The UNAS 2 takes two hard disks, and somewhat predictably the UNAS 4 takes four. Both are connected and powered via a PoE Ethernet cable, which makes it incredibly easy to set up and configure if you have a modern PoE switch environment. Note, however, that the UNAS 4 requires PoE+++, rather than the lesser PoE++ of the UNAS 2 model, but both come with appropriate PoE injectors in the box.

The standard configuration for the UNAS 2 is to mirror the two disks. You might have wanted to span the two drives, but this isn't sensible in a world where single drives can be larger than 20TB. I expect UniFi is going to offer a four-disk RAID array in the UNAS 4, offering three times single disk storage.

The UNAS 4 also offers two M.2 NVMe slots for caching, to improve read/write performance. Although it's a 2.5GbE port, which you will likely saturate on the UNAS 4, that's still a good speed for the intended desktop and small office workload.

For the more "professional" workloads, we turn to the 19in rack-mount UNAS Pro 4 and Pro 8 models, which effectively replace the existing UNAS Pro product. As you can guess, the Pro 4 is a four-drive unit in 1U of height, the Pro 8 an eight-bay version. Both can take two M.2 NVMe drives for caching.

For connectivity, the Pro 4 has a 1GbE port and two 10GbE SFP+ ports. The Pro 8 increases this to a 10GbE port and two 10GbE SFP+ ports. The Pro 8 also has two hot-swap power supplies.

I'm very excited by these four new models. The price of only £191 for the UNAS 2 means that there's no excuse for not having mirrored NAS storage on your home network. It's ideal for a student to have local Time Machine backups, or other SMB storage from Windows or other operating systems. Yes, you have to add the hard disks, but two 10GB drives isn't going to break the bank, and is incomparably better than the USB flash drive method that many appear to like. I never want to hear "my thesis has disappeared, it was on my flash drive and that doesn't appear to work" ever again.

A combination of UNAS 2 along with cloud storage replication, which it supports, gives a really solid base. A UNAS 4 is good for a home shared multi-user environment. The rack mounts are for more professional use, and the addition of NVMe caching is going to remove one of the small niggles I have with the UNAS Pro, which is its sluggishness when browsing into an infrequently read folder.

I'll certainly buy a UNAS Pro 8 for the lab, to work alongside the UNAS Pro, and probably start my migration of primary storage away from Synology, relegating it to secondary tasks such as security cameras and other app-based solutions. And then in time, I can move the cameras to UniFi Protect if I want to make the jump.

ABOVE UniFi's new UNAS 2 and UNAS 4 NAS devices make mirroring easy

Synology still has no answer to drive certification

A small follow-up to my comments last month about Synology's requirement to use only certified drives in its new devices – which just happen to be only Synology-branded drives at present. I had hoped that the recent big public event would have given the company an opportunity to open up about this further, and to announce new certifications.

I took a look at the product compatibility list (**tinyurl.com/375synology**) and searched for HDD/SSD and then "Type of 3.5in SATA HDD". To my surprise, I saw a lot of drives listed, including my favourite IronWolf drives. Intrigued, I clicked on the View+ button on the Compatibility column, and was presented with a list of Synology devices that are deemed to be compatible. And, of course, there's no sign of the new 2025 model year products. So far, then, it looks like it's a case of no change.

BELOW My favourite IronWolf drives were listed as compatible by Synology – but it appears they're not

Finding old documentation

I have been trying to declutter my life, getting rid of old things I no longer need. And there's a lot of stuff that I've hoarded. While it's fun to look back and reminisce, sometimes you just have to be brutal and force yourself to confront the reality that you will never need this item again.

However, there were two items I found that really could not go into the bin.

The first was a document I typed up on 27 June 1985, at the end of my industrial year placement from university. I worked for a year with Angus McKenzie, a well-known audio and radio technical expert and writer, at his house in North Finchley. Working with someone who was blind was very much a learning experience for me as a fresh-faced 21-year-old, and the wisdom gained there has stood me well ever since.

This was the very early days of computer control of test equipment. Back then, we used the HP85 desktop device, complete with built-in thermal printer, and a more powerful HP9816 scientific workstation. Each connected to various pieces of test equipment via the then-common GPIB/HPIB 488 interface, which was a wonderful if somewhat physically clunky set of stackable plugs and stiff cables. But it worked extremely well. From HP Basic, it was quite easy to instruct a device to perform a settings change, or to take a measurement.

At the end of my industrial year, I needed to write up a document covering how to run the HamRig84 platform that I had written, so that the new incumbent could keep the process working well. This setup was used to test amateur radio transmitters and receivers, and entered around the then-new Marconi 2019 signal generators and the utterly wonderful Marconi 2382 spectrum analyser (**tinyurl.com/375marconi**).

Can I allow myself a smile when I read the following?

"General notes on the Marconi 2382 Analyser. Please remember: test equipment will always win in the event of an argument. It can curl up and die, you cannot!"

I'm pleased to see that my wry sense of humour was present and correct some 40 years ago.

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In the same box, I came across the heavy volume that is the "Microsoft Windows NT Advanced Server System Guide". This near 700-page tome covered everything you needed to know about NT AS, based on NT 3.1, in 1993. I looked at the page titled "System Requirements" and was amused to see it needed "a 32-bit x86 microprocessor (such as Intel 80386/33 or higher) or supported RISC-based microprocessor such as the MIPS R4000 and DEC Alpha".

It also needed a faintly ridiculous 90MB minimum free hard disk (or 110MB for the RISC version). And 16MB of RAM. A mouse was optional, although a floppy disk drive was required for x86 or a SCSI CD-ROM drive for RISC systems.

While I should admit that this covers some 34 years of computing change, it's worth remembering that I have more core capability in my mobile phone today than was required for NT Advanced Server back then. How things have changed.

ABOVE The Marconi 2382 spectrum analyser: always a winner in an argument

"I see my wry sense of humour was present and correct some 40 years ago"

End of life Intel Mac

I had to wait until the arrival of the final version of macOS 26 to know whether my 2018 six-core Mac mini Intel Core i7 unit would be supported on the final release. It seems not, and it has just updated to Sequoia 15.7. This is annoying because the Tahoe 26 public and developer beta is offered for it. While I could probably force it onto the machine, I don't want to be left in an unsupported late beta in limbo on this hardware. Not being offered the final release is a clear indicator that it's hit the end of the road for new OS updates.

I'm not particularly bothered: Apple will continue to support 15.x for a long time to come. Today I just got the update to Safari 26.0.1, so that is moving forward. And I need to keep an Intel desktop Mac running because I rely on it for Parallels virtual machines running Windows 11. Even that works fine still on my 2013 Mac Pro trashcan, so the future is not terminal for this box.

However, as I predicted, new OS support for Intel is now done, apart from a very few devices that were last in the line.

Cars, noise, Millbrook

I spent a day recently at Millbrook, the world-famous car test track near Bedford. It's a great place, celebrated for its high-speed bowl and Alpine handling track, which features a carefully shaped hill bump that allows cars to gently go airborne. It was at Millbrook that they filmed the famous car rolling scene in the Bond film a few years ago.

I was guest of Axiometrix, the group that owns GRAS Sound, Audio Precision and IMC. These companies are the world leaders in audio, measurement microphones and industrial data logging for strain gauges and equivalent technologies. I know the GRAS and AP side very well, having significant investments in their test equipment; less so the IMC area.

The day focused on all the aspects of noise and data logging for automotive testing. It was fascinating to see how they have replacement wheels for cars that have built-in accelerometers, strain gauges and so forth, and how these can connect wirelessly to data logging that you put

BELOW Drive time: a day out at a racetrack was very instructive

on the back seat of the car. Watching an Audi E-tron be taken for a brisk hoon around the skid pan, while watching all of the data telemetry in real-time, was quite instructive.

When it comes to measuring sound – both vehicle sound and the in-car entertainment – it's a very difficult space because of the terrible acoustics of a car. I've tried fitting our HATS (head and torso simulator) into a car, and it wasn't good. A HATS is a full simulation of the trunk and upper body of a person. The head has anatomically correct ear structures and outer ear canals, and an IEC reference voice box and mouth structure, so it can speak correctly as if it were a person. A seatbelt wasn't enough to stop it rolling around, and given that the purchase price was in the multiple tens of thousands, I decided to stop this line of approach.

However, GRAS is working on a proper car mountable HATS called AutoKEMAR, which mounts onto the ISOFIX mountings within the seat, which are usually used for children's car seats. The device can be adjusted to multiple positions, and this is really useful if you want to test the acoustic capabilities of the loudspeakers that are now being built into headrests.

Incidentally, most cars use a system called A2B. This is a wired protocol that allows a head unit to talk to multiple items in the car, such as amplifiers and speakers, over a simple serial wired network (**tinyurl.com/375carA2B**). In principle it sounds great, but it's clear from what I was shown that Analogue Devices, the inventor of this, has somewhat dropped the ball in terms of putting together a proper test framework. A good friend of mine working in the automotive R&D space told me that it's a real mess, and that car manufacturers have to build their own custom software, and then they have to try to build custom management, injection and extraction software on top of this.

Anyway, overall this was an excellent day and a great opportunity to meet up with friends and colleagues. This sort of technology isn't cheap, but it is of the highest quality, and is absolutely what you need if you want to work in this space.

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LEE GRANT

"The day ChatGPT learns to sort out Mrs Miggins' password problems, I'm stuffed"

Are these tales involving AI, dodgy porn sites and motorhome plumbing just a shameless plug for the *PC Pro* Podcast? Like and subscribe to find out

As all the cool kids know, the place to be on a Thursday at 1pm is sitting next to your crystal-set, listening to the *PC Pro* Podcast as it broadcasts to the nation. There are over 700 episodes to endure because it began way back in 2007 (don't do the maths, there have been a few "pauses"), making it one of the longest-running technology podcasts on the planet, which is rather impressive.

My reason for including this shameless plug is that as the podcast covers the latest tech news, we have the luxury of talking about developing topics over many months, and our current "oh-hell-are-we-talking-about-that-again?" is AI.

What is particularly fascinating for me, as a *PC Pro* Podcast listener, is discerning the subtle (and sometimes not so subtle) differences between the hosts about how they use AI technology and the broader implications of its use. As a *PC Pro* Podcast guest, my contributions to our round-table often focus on the environmental aspects of the technology as I'm often compelled to admit that my initiated use of AI, in day-to-day life, is rare. The Damoclean caveat being that the day ChatGPT learns to hold a soldering iron or sort out Mrs Miggins' password problems, I'm stuffed.

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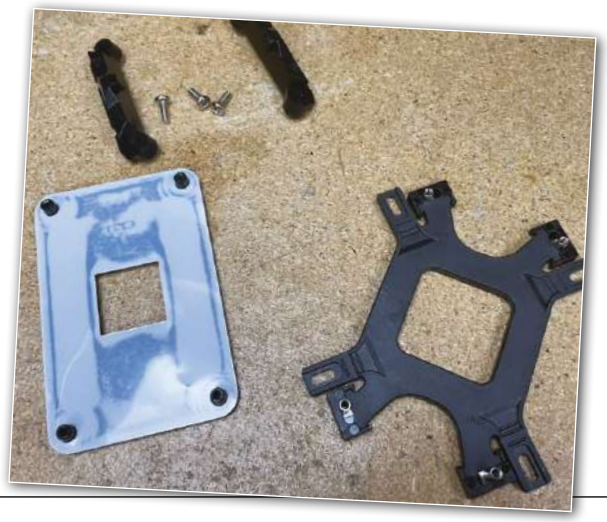
"Usually, upgrades are easy to perform. This machine was more challenging"



BELOW The backplate on an AMD system: possibly designed by a furious drunk sadist

However, a desktop PC arrived in the shop last month for a CPU upgrade and I resorted to AI in order to finish the job. If you read Tim Danton's fabulous feature on the joy of desktops (*see issue 374, p26*), then you'll have seen me wax lyrical about how their modularity will often bring long-term upgrade options to keep hardware in use for far longer than semi-disposable laptops. Usually, upgrades are easy to perform, greatly reducing the chances of damaging components with a fitting error. This machine was more challenging.

The CPU fan was held onto the motherboard in a pretty typical way for an AMD Ryzen system. A shielded-steel backplate fits underneath the motherboard, and the cooler is screwed into place from above. This sandwiches the CPU between the heatsink and backplate, maximising the thermal dissipation and stopping things from rattling around. As I stared at the cooler on the desktop, I could see four retaining bolts connecting the heatsink to the backplate, but I couldn't see a way to release them all without de-rigging the entire motherboard to lift it out of the chassis. There had to be a better way.

I've fitted thousands of CPU fans. Some are made by sensible engineers who understand that it's possible to make a product popular and desirable by ensuring that it's easy to use. Others, I imagine, are manufactured by a team of furious yet perpetually inebriated sadists whose only pleasure in life is to engineer coolers that defy both logic and physics before proliferating them around the world by gifting them to OEMs in a bid to financially eradicate any commercial competition. Perhaps.

I tugged gently at the plastic cowling surrounding the fan blades, hoping to reveal a hidden lever or screw that would save a rebuild. Nothing budged, and my instinct kept screaming that if the cowling wouldn't budge, then I was doing

something wrong. Compounding my confusion was the lack of markings or branding identifying the cooler. My next step should have been to trawl the internet to find the manual for whatever tinpot piece of cheap junk was sitting in my shop, but like a man whose toilet seat had been stolen, I literally had nothing to go on.

It took a few moments before I realised that my phone could reveal the answer. I snapped an image of the cooler and threw it at Google Lens, telling it to trawl the internet on my behalf. Three seconds and a stack of CO_2 emissions later, AI gave me a correct answer. Google Lens identified that the mystery component was a Cooler Master MasterAIR G100M CPU cooler, which quickly led me to the manual, revealing that the removal process is awful and there's no magic button hidden beneath the cowling.

Now, I can hear some of you grumbling, "get a grip man and just take the board out". The reason for my temporary aversion to motherboard removal lay behind the side panel of the machine. It was a tangle of wires and leads I had no desire to tackle. Over the years, the owner of this machine had added four hard drives: one SATA, three SSDs. Sadly, they'd gone for quantity over volume and, despite this plethora of platters, the 128GB boot drive was full, causing quite a few machine issues. As I was only being paid to swap the CPU, it may now become clearer why I was so keen to avoid poking the snakes while removing the board.

The solution was rather nostalgic. When we opened the shop over two decades ago, my father bequeathed to me his RS toolkit, which he'd used during his career as a military electrician. Squirrelled away in one of its many pockets is a set of mini-spanners which, with a bit of coarse language and not a little blood loss, enabled me to slowly remove the bolts, releasing the G100M cooler from its mounts. Thanks, Dad.

Not for the first time, nor the last, you saved the day.

As I mentioned earlier, Cooler Master is not alone in designing coolers with difficult-to-access fittings. AMD has form here, too. To bolt a Ryzen 3 or 5 to a board requires the removal of the AM4/5 brackets so the heatsink can be screwed into the steel backplate. For reasons only AMD can explain, the Ryzen 7 uses a different fitting, clipping onto the AM4/5 brackets in the same way that the old Athlon and Sempron chips did. I've never understood why there's a difference, but if anyone from AMD could diffuse my confusion, then send me a pigeon.

ABOVE/LEFT Google's AI image search came up trumps in my search for a mystery component

"Like a man whose toilet seat had been stolen, I literally had nothing to go on"

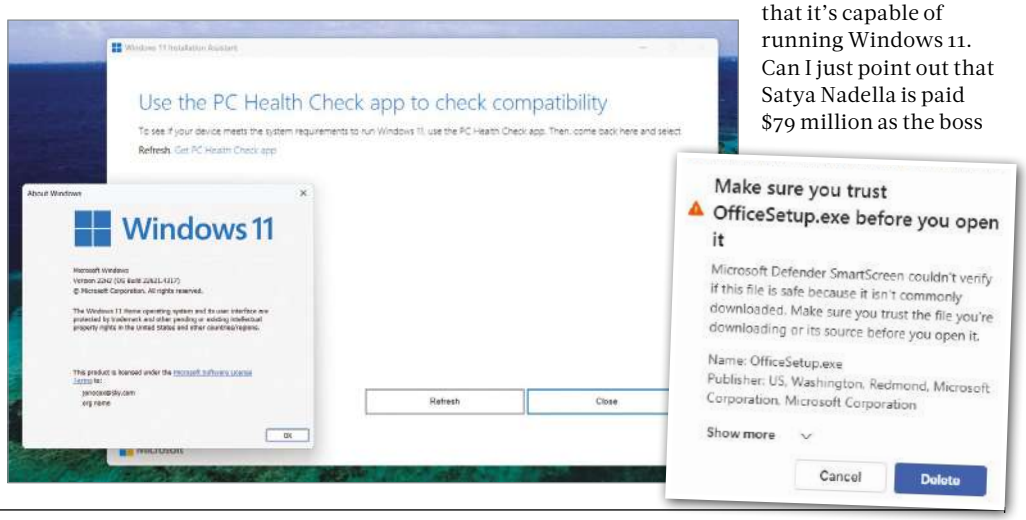
Will the real Windows 11 please stand up?

Back in issue 354, I revealed the secret and definitely made-up division in the heart of Microsoft, the Department (of) Overzealous Random Knob Switchers (DORKS). They're a crack team (or possibly a team on crack) whose purpose is to confuse the hell out of its customers. I wouldn't care so much if it didn't make my customers so cross, causing some to accuse me of mis-selling them a laptop pre-loaded with Windows 10, rather than Windows 11.

Examining one machine, I could tell from the interface that the machine was Windows 11. "It says it's out of date." The penny dropped. Windows Update was complaining that the version of 11 pre-loaded at the factory was now "out of date" and required a simple update. Although I'd handed the customer a brand-new, factory-sealed laptop, it may have been many months since it was built, and naturally updates will be required. This is where the DORKS at Microsoft really earn their money, because this brand-new Windows laptop would not update (and I've seen this on many machines from different OEMs).

The fix should be to download the Windows 11 update tool and let it rip, but an unhelpful error message appears: "To see if your device meets the system requirements to run Windows 11, use the PC Health Check app." To translate: a laptop running Windows 11 refuses to update Windows 11 because it's uncertain that it's capable of running Windows 11. Can I just point out that Satya Nadella is paid $79 million as the boss

BELOW Is your laptop that's running Windows 11 capable of running Windows 11?


Use the PC Health Check app to check compatibility
Refresh
Windows 11
Refresh
Close
Make sure you trust OfficeSetup.exe before you open it
Microsoft Defender SmartScreen couldn't verify if this file is safe because it isn't commonly downloaded. Make sure you trust the file you're downloading or its source before you open it.
Name: OfficeSetup.exe
Publisher: US, Washington, Redmond, Microsoft Corporation, Microsoft Corporation
Show more
Cancel
Delete

of Microsoft and he lets this nonsense happen. If he dropped a clanger like this in a real job, he'd be out.

The second *piss de resistance* from the DORKS occurred on another brand-new Windows 11 laptop setup. The process went like this. I cut the security seals with a knife. Removed the laptop from the box. Plugged it in, turned it on. Inputted the customer's Microsoft account details. Opened Edge to visit Office.com. Downloaded the installer for the customer's Office 365 setup... which was stopped by Windows Defender as a security threat: "Microsoft Defender SmartScreen couldn't verify if this file is safe because it isn't commonly downloaded."

To paraphrase the late Sir Terry Wogan: is it me?

Family affairs

Another frequently chewed topic on recent episodes of the *PC Pro* Podcast has been the Online Safety Bill. This is a long and convoluted piece of legislation formulated from a subtle blend of good practice, workable strategies, wishful thinking and the technically impossible. How its implementation will impact your day-to-day life is greatly dependent on your relationship, and usage, of technology. Sadly, as is often the case, important considerations of how the bill will affect the emotional wellbeing of those who work at independent computer repair shops has been overlooked.

Henry is a regular. He is a single man of a certain vintage and – well, let's be straight with one another – is entertained by adult websites. My relationship with Henry's laptop is based on frankness, realism and antibacterial spray. It's been a long time since we crossed the Rubicon of embarrassment whenever he came into the shop with an internet problem invariably caused by one of the specialist websites in his history.

There is no judgement here, and over the years, whatever malware or scam he's triggered by his penchant for GrandmaGetzFreaky.org has been sorted. It's not easy. Explaining a scam to a victim is a delicate conversation that isn't made any easier when the unwary have triggered a trap and phoned the "Microsoft" helpline without considering if the one of the world's tech behemoths would genuinely be advertising on BritainsBestBoobs. (Isn't that Parliament Live?) When he arrived at our shop with a furious look on his face, it was something I had seen many times before.

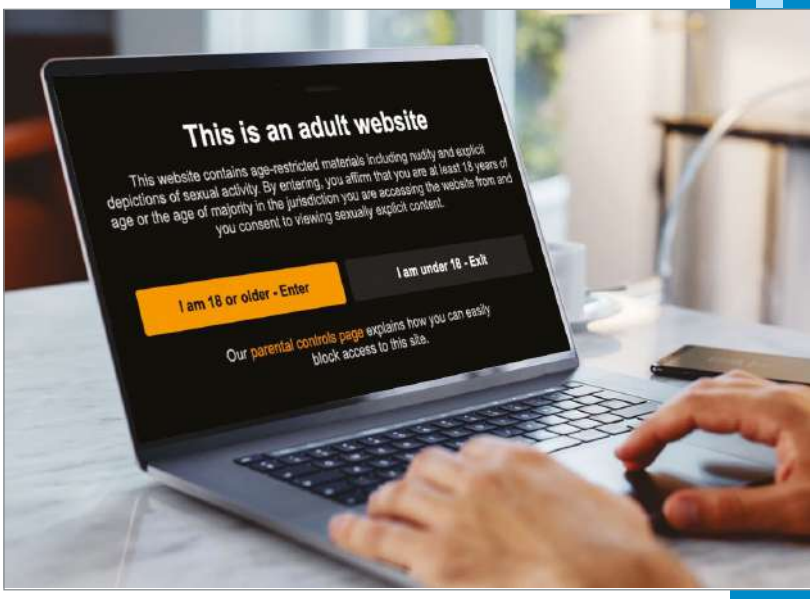
This time, Henry believed that his new ISP, CityFibre had curtailed his internet viewing. On the day of connection, he'd settled down to view the latest on GameOfBones and was furious to discover that "parental controls" had been applied. Of course, it had nothing to do with CityFibre, but the OSB's requirement for age verification for sites likely to cause distress to computer repairers... and under 18s.

So once we'd got Henry set up with unadulterated adult-rated verification, he was a cheerful man. He left the shop, leaving a sort-of verbal review which, for the sake of humanity's mental wellbeing, won't be published on Google and will only ever appear in this edition of *PC Pro*: "I'm so pleased that you're here to help me out as I can't ask my granddaughter about things like that." Perhaps we need to get the sign-writer to daub "Porn verification services" on the front of our shop.

Are you the farmer?

Way back in the middle of the summer, I found myself in a repair situation for which I was utterly unprepared. I was in the middle of a sheep field, somewhere near Kettering, when my daughter spotted that the floor of our 25-year-old motorhome was wet. A valve connected to the hot-water boiler had cracked, and around 80 litres of water scheduled to come out of our shower and taps was now turning our living area into a water park.

If you've never had to work on the internal plumbing of Hymer motorhome, then the brilliance is that most of it is repairable (hurrah!), providing you have the correct parts (er...) and are only six inches tall. It's like a house but much, much smaller. I'll save you the agony of reading how I stopped the leak as it's long-winded, rather tedious, very physical, and you're probably already wondering why I'm talking about plumbing in the world's greatest technology magazine.


This is an adult website
This website contains age-restricted materials including nudity and explicit depictions of sexual activity. By entering, you affirm that you are at least 18 years of age or the age of majority in the jurisdiction you are accessing the website from and you consent to viewing sexually explicit content.
I am 18 or older - Enter
I am under 18 - Exit
Our parental controls page explains how you can easily block access to this site.

ABOVE Problems with adult verification? Just ask Lee...

"At one point he quipped, 'You'll get 300 words out of this', and he wasn't far wrong"

The reason is that when I emerged from the motorhome, drenched with sweat, a very nice man approached. "Hello," he smiled. "Do you mind my asking, are you Lee Grant from the *PC Pro* Podcast?" For those who join us on Discord at 1pm every Thursday for the podcast, the name "Runningdack" (for it was he) will be very familiar. We had a lovely chat and at one point he quipped, "You'll get 300 words out of this", and he wasn't far wrong.

And now over to Suzy in Dictionary Corner...

My repair to the Hymer's water-system wasn't a permanent fix as I didn't have the correct parts. In English, we would call this a "bodge job", but I recently learned that parts of Brazil have a more elegant word: Gambiarra. It refers to "improvised solutions to concrete problems that appear when one doesn't have access to the proper tools, materials, parts or specific knowledge to perform a given task". (For more about Gambiarra, see **tinyurl.com/375bodge**.)

In Spain, meanwhile, phrases similar to "hizo un MacGyver" have passed into common usage. If one of those words looks familiar, you're correct. The Spanish have used anthimeria to turn 1980s TV hero MacGyver (played by Richard Dean Anderson) into a word roughly meaning to "expertly bodge something using ingenuity". I think that is amazing. I learned this at FixFest 2025, a two-day international repair conference in London. There will be more on this event next month, including how I finally met one of my repair heroes... and straight away he put me to work.

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MAKERY

Gambiarra: repair culture by Felipe Fonseca

Felipe Fonseca co-founded the MetaReciclagem network in Brazil in 2002. This "historical" maker denounces the entrepreneurial drift of the movement in "Gambiarra, repair culture". For Makery, the Brazilian activist explains his thesis.

BELOW Gambiarra: a fine word borrowed from Brazil to describe a bodge job

OLIVIA WHITCROFT

"My client had been playing an annoying game with me, but it was actually a good exercise"

Contract length isn't everything: clear drafting and prioritising key issues matter most, as Olivia explains succinctly (but not too succinctly)

I was recently sent two agreements to review in the same week by two companies. The relationships they covered were not dissimilar. Under each agreement, one party granted rights to the other party to carry on particular activities, involving the use of data and intellectual property (IP).

One contract was five pages long. The other was 205 pages.

The first was short on detail. I read it quickly and was sad there wasn't more of it to get my teeth into. The second was *wordy*. Each clause had thick chunks of text, and many sentences had up to 100 words. I needed multiple cups of tea and biscuits to get through it.

I had a similar concern with both agreements: how did the parties intend the provisions to work in practice? Some terms of the first were quite vague, and there may not have been enough there to establish what the parties wanted to happen. The second was at the other extreme. A lot of provisions were so complex, it seemed unlikely the parties would be capable of implementing them fully.

Short or long?

A short agreement ensures you have something in place to govern the relationship, and, if well drafted, can help to manage the key terms. But if it's too short, there's a risk you aren't clearly addressing all relevant issues. If there's a dispute, the contract may be missing details to help to resolve it. It may lack certainty on intended duties and remedies under the contract to determine, for example, what steps are expected to protect IP and data, what happens if they're misused, and who does what if there's a security breach. Nevertheless, there may be other drivers to keep a contract concise, such as creating a friendlier impression, speed of agreement, and ease and flexibility of implementation.

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"I was sent two similar contracts. One was five pages. The other was 205 pages"

A longer agreement can address more issues and eventualities. If there is a dispute, the contract may (again, if well drafted) more clearly address what the duties and remedies are. Terms may include, for example, standards of quality in use of IP and data, rights to terminate if they're misused, and notification of security breaches. But it can take longer to prepare, negotiate and agree. There's also a risk that the parties get bogged down in so much detail that the contract is hard to understand, too rigid to implement, or has inconsistent provisions. It then goes full circle and lacks certainty on intended duties and remedies. But a more detailed agreement can provide a clearer legal position than a shorter one. This may be preferred by legally sophisticated contracting parties.

Of course, the length of a contract doesn't in itself determine its quality or suitability. I'm often approached by smaller tech businesses, who think they must have an extensive set of complex-sounding terms to be "legally covered", such as: long-drawn-out IP protection and infringement clauses; cumbersome data management and security breach processes; and heavy liability exclusions and indemnities. However, they're secretly wishing they had some concise and easy-to-understand terms that won't scare off their customers and contractors. We work together to produce something that isn't too complex, while giving comfort that areas of particular concern are being addressed.

Rather than worrying just about length, a focus on clear drafting and prioritising key issues can help you to achieve what you want from having a contract at all.

Cutting down a long agreement

Several years ago, my first draft of a services agreement ran to 20 pages, based on the client's instructions and standard provisions for that type of relationship. My client gave me some feedback on the various parts, and asked me to cut it down to ten pages.

I removed some terms the client said weren't important to them. These included practical matters that the parties could address separately, such as processes for project management meetings and reporting. I also took out some interpretative clauses on how to calculate time periods and the meaning of "person". I made the drafting of other clauses more concise; for example, reducing detail within *force majeure* and data-handling provisions, and within boiler plate clauses. In making those changes, there was more scope for disagreement in how these matters should be addressed in practice. However, the client's key business and legal issues were still covered.

My client was now happy with the scope of matters covered by the agreement. However, they wanted something simpler to present to other stakeholders, and requested that I please reduce the length even more, to five pages. I removed the definitions section at the top, instead defining key terms in the first place they were used; this made it more difficult to navigate, but it still worked. I left out other definitions and removed "for the avoidance of doubt" wording, where the intention of the parties was likely to be clear without them. We lost some precision, though they were areas where there was less likely to be a dispute. I also took out some boiler plate, such as "severability" and "no waiver" terms, and some details of remedies

BELOW Long contracts can be offputting, but it's the terms within that are important

and liabilities. This could lead to uncertainties if these issues arose, and general contract law would determine what should be done.

I could have predicted what came next: "Two pages now, please." It was time to throw the boiler plate section out of the window completely, except for covering two or three of the most important issues very briefly. I had another stab at making each clause even more concise; provisions covering higher-risk issues were heavily condensed. I then removed the odd word here and there to stop clauses running into new lines, and sneakily reduced the line spacing.

And then the final blow: "I want it on one page." This was a big challenge. I couldn't see ways of cutting it down without removing core elements of the agreement, and the client probably wouldn't take kindly to a size 6 font. I advised them that cutting out even more risked losing the whole benefit of the contract. I think we settled on about a page and a half, with some terms slipping into the signature page.

My client had been playing a slightly annoying game with me, but it was actually a good exercise, and I regularly use a similar technique to reduce complexity in agreements.

I should add that each provision I reduced or removed during the cutting-down process wasn't originally pointless. At each stage, we lost some precision or clarity, or changed how risks were addressed, and I explained the potential legal impact of the shorter terms. If a contract has clauses that add no value at all, then it is of course a much easier job to simply remove them.

Building up a short agreement

On the flip side, short agreements may need to be built up to cover all intended business and legal issues. We don't want to needlessly convert all contracts into 20 (or 205) pages just to look impressive, but playing the reverse of the cutting-down game could be a fun way to lead us through the process, to get where we want to be.

Let's say we start with the bare bones of an agreement at two pages long. First, two pages to five: improving fundamental contract elements; adding provisions on important issues not yet addressed; and clarifying any vagueness and ambiguities.

Next, five pages to ten: beefing up provisions to be more specific and clearer on their intention; developing the contractual structure and interpretative provisions to give more precision; and to allow clearer navigation and understanding.

Finally, ten to 20 pages: adding provisions to address lower risk areas; expanding the drafting of existing clauses to cover a wider range of eventualities; increasing font to size 16 and doubling the line spacing.

ABOVE **If you still like printing, you can always use a red pen to cut down contracts**

Picking the right battles

Where did we end up with my two reviews? Maybe surprisingly, length wasn't a chief concern for my client with the 205-page contract. However, we used a similar approach to the cutting-down game to provide a focus for assessing risks and negotiation. The company wanted to ensure it had the rights it needed for the relationship to work, without removing or overly amending provisions that were important to the other party.

For the five-page contract, we landed on eight pages. We added terms to address priority issues, and expanded on others to be clearer on their intention. But we didn't make it too bulky, which may have been unappealing to the other party.

These outcomes may be completely different in other cutting-down or building-up exercises. In deciding what battles to pick, we need to take into account the nature of the relationship, the client's risk appetite and the priorities of each party. The goal wasn't just to achieve perfect terms, but also to avoid lengthy and costly negotiations, and wrecking the relationship with the other party before it even got started.

Can AI help?

What's an article these days without mention of AI? There are some amazing AI tools that can help to draft and review contracts, and those that I've used have done a good job at pulling out and summarising key issues. When tackling longer contracts, AI has identified a similar concern to that I raised above – the risk of practical inconsistencies and disputes over overlapping or competing obligations.

Having said that, the same AI also did its best to convince me of a regulation I needed to address in my contract that didn't actually exist. And the finesse of legal drafting, in the wider commercial context, may still need a human touch. AI itself advised me that legal professionals should review and refine AI-generated draft contracts to ensure accuracy and compliance. So my expertise is still valuable for the timing being (phew!).

"There are some amazing AI tools that can help to draft and review contracts"

Build on experience

Once you've put a contract in place, your experience of how it operates in practice will help to guide priorities for future contracts. A few examples from my experience: you discover your customers find your standard terms too long and confusing, so you create a shorter version. Suppliers always negotiate removal of a term in your data processing contracts, and it saves time (and legal fees!) to simply not include it going forward. You receive multiple queries on the meaning of a particular service standard, so you expand on it to clarify. You experience difficulties in terminating contracts under "material breach" provisions where the problem is late payment or a reputational concern, so you build in additional termination rights for these eventualities.

The five-page agreement (converted to eight pages) was finalised and put in place relatively smoothly. The 205-page agreement rumbled on through an assessment and negotiation process. Maybe it ended up being a more watertight agreement, but with a significantly higher investment of time and costs along the way.

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BELOW **AI can help, but you'll still need a legal professional to check everything**

DAVEY WINDER

“These are formidable new weapons in the smartphone anti-spyware arsenal”

Davey’s memory isn’t what it used to be, nor is the iPhone’s – and the latter is a very good thing, thanks to the addition of EMTE

I transitioned from a fully Microsoft and Google ecosystem to a mostly Apple one a few years ago. I say mostly as I maintain both a Windows laptop and an Android phone, but neither is what I’d call a daily driver. So it should come as no great surprise that, like so many Apple aficionados, I looked forward to the annual updating of my iPhone.

This year, however, it wasn’t the orange colourway – and you should know that I really love orange – or the battery life, or even the new camera improvements that got me tech-horny. And no, it certainly wasn’t the AI stuff. What was it, then, that made me trade in my perfectly functional iPhone 16 Pro Max? I present to you the acronym at the heart of my upgrade decision, and which should weigh heavily on yours: EMTE.

What the heck is EMTE?

To understand what EMTE is, we first have to explore MIE, which isn’t, I’m sad to report, the latest movie starring Tom Cruise as Ethan Hunt. MIE is, in fact, short for Memory Integrity Enforcement, while EMTE is the acronym for the Enhanced Memory Tagging Extension.

Both of them are formidable new weapons in the smartphone anti-spyware arsenal.

Although it wasn’t on the radar at the Apple event that launched the iPhone 17 series, MIE is actually a big deal if you ask me, or anyone who actually gives a flying expletive about security. As part of the iOS 26 update, MIE, according to the Apple Security Engineering and Architecture team, is not only an advance in memory corruption vulnerability protection, but also “the most significant upgrade to memory safety in the history of consumer operating systems”.

Davey is a journalist and consultant specialising in privacy and security issues
@happygeek

That’s a pretty bold statement to make, and ordinarily, I would be doing my best to rip some holes in it. However, on this occasion, I have to agree. Of course, memory safety isn’t exactly something that your average consumer has on their “should I buy this £1,000 phone?” checklist. It should be, though, when you consider that memory vulnerabilities are such a common method of attack, especially when we’re talking about spyware in all its forms.

Note that neither I nor Apple is talking about run-of-the-mill malware here, but rather dedicated spyware. Apple calls this “mercenary spyware” and alludes to it being in another league of complexity to standard malware, often thought of as being the unique realm of state-sponsored espionage actors and targeting just a handful of victims at a time, if not a single specific target. This scenario is, undoubtedly, based in fact. However, the amount of money required both to undertake such multi-exploit chain attacks and potentially gain by those who are successful – especially given the organised and highly profitable nature of ransomware crime syndicates – means that we all need to take spyware, mercenary or otherwise, very seriously indeed.

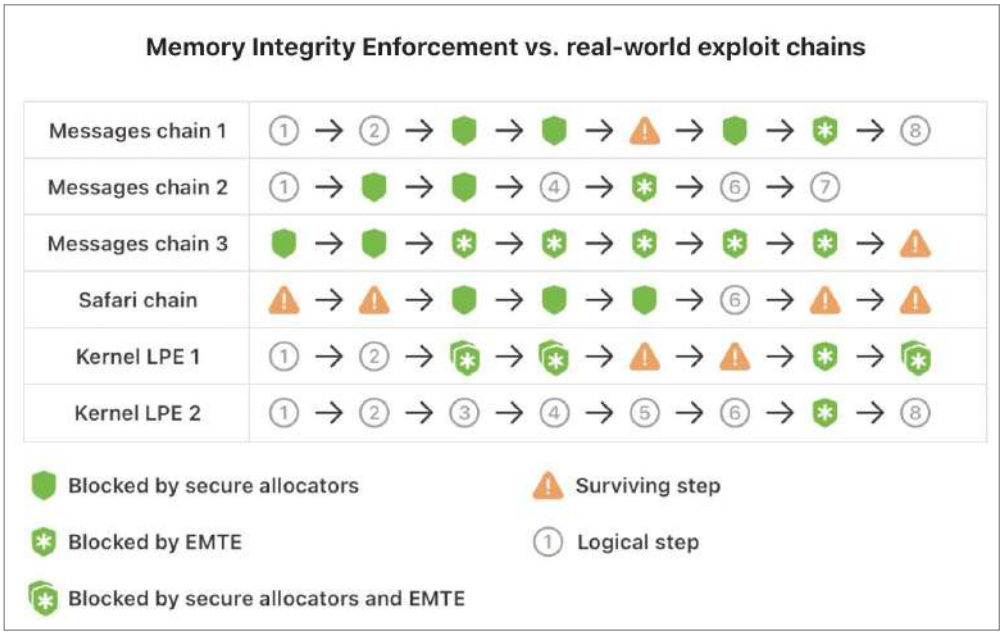
Spyware can, as the name suggests, be used by someone to stalk you, blackmail you – and use you and your data as a stepping stone for a more profitable attack. I’m not shouting fire in a crowded place while trying to sell smoke alarms here, but rather pointing out that spyware is no longer the realm of government agencies alone. Some users are, and always will be, higher value than others: politicians, government employees, high-level executives, activists and, yes, even journalists. This doesn’t mean that anything that can be done to minimise the threat for all should be poo-pooed; quite the opposite – it should be celebrated and employed. Hence, this column.

So, back to what MIE is and how it works, and where EMTE, the iPhone 17 and Air, come into play.

Memory Integrity Enforcement explained

MIE is part and parcel of the iOS 26 update, which I’m hoping you will have installed by now if your device allows it. If it doesn’t, by the way, then maybe it’s time to upgrade to a newer, more secure iPhone.

Apart from patching known vulnerabilities, the introduction of MIE with iOS 26 is a major step forward. Just think about it for a moment: memory is shared across the apps you use on your smartphone, along with the kernel and assorted user processes. I’d say that memory is,



BELOW Memory Integrity Enforcement is a big deal for smartphone security

perhaps, the most critical of attack surfaces. So, by introducing what is in effect an also-on memory protection, Apple is moving the goalposts by making that attack surface much smaller and harder to exploit.

Not that the Apple Security Engineering and Architecture team is any stranger to making memory protection part and parcel of the iPhone experience. More than ten years ago, it introduced the Swift programming language, which is memory safe by design. Yet vulnerabilities can still be found and exploited. "Known mercenary spyware chains used against iOS share a common denominator with those targeting Windows and Android," SEAR admitted. "They exploit memory safety vulnerabilities, which are interchangeable, powerful, and exist throughout the industry."

Which is where MIE comes in, and, sorry, it gets necessarily geeky now. SEAR built on work by Arm from 2019: the Memory Tagging Extension (MTE) that password-protects memory allocations in hardware and allows developers, in theory at least, to better uncover and patch memory corruption bugs. This work led to the development of the EMTE specification alongside Arm in 2022 to provide an always-on version of MTE.

While the Apple engineering analysis showed that EMTE had "great potential as specified," SEAR said, "a rigorous implementation with deep hardware and operating system support could be a breakthrough that produces an extraordinary new security mechanism." And the culmination of that analysis and the work that has followed can be found in MIE.

Memory Integrity Enforcement starts, the SEAR in-depth technical paper confirms, with secure memory allocators. Specifically ones that use "type information" to determine memory allocation organisation, namely kalloc_type, xzone malloc and WebKit's libpas.

Type-awareness, as it relates to the placement of secure memory allocators, is a big hurdle for threat actors using memory corruption techniques in attacks, employing use-after-free and out-of-bounds vulnerabilities. This is because, to quote SEAR once again, "an attacker's goal is to create overlapping interpretations of memory, which they achieve by controlling the precise position of certain allocations – of a specific type – that is advantageous to them".

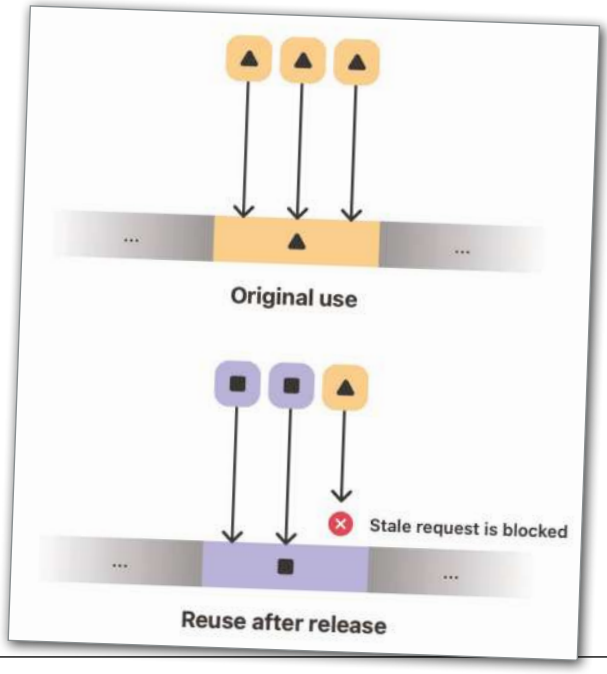
Think of MIE as being a first defence against memory corruption exploitation, courtesy of its ability to detect said exploits when the first malicious access is attempted. Importantly, MIE provides this protection without any negative impact on performance, and even a potentially positive one, for the allocators that are being replaced. Something that can impact upon performance, however, yet is essential to get the best out of the newly introduced memory corruption protections, is Enhanced Memory Tagging Extension. Which is why users of the iPhone 17 series alongside the iPhone Air will be the first to be able to use this, and the reason is primarily the adoption of the new A19 and A19 Pro chips.

ABOVE **Users of the iPhone 17 will be able to use EMTE thanks to Apple's new A19 and A19 Pro chips**

Enhanced Memory Tagging Extension explained

SEAR said it has dedicated more Apple Silicon resources to the area of security than ever before, and part of that includes secure allocators, tag confidentiality protections and, of course, MIE and EMTE in general.

The simple explanation of EMTE in action is that it provides every chunk of memory with a secret tag, one that changes every time the memory allocation is reused and is checked by Apple Silicon every time a resource attempts to utilise that memory. If the tag doesn't correspond with what it should be, then the resource is kiboshed and the event logged. By so doing, your iPhone 17 or Air can in effect block memory vulnerability access attacks before they can actually do anything malicious.



BELOW **How Memory Integrity Enforcement blocks buffer overflow attacks**

SEAR explains this best by the use of two common memory corruption attack scenarios: the buffer overflow and use-after-free vulnerabilities that any Chrome user who checks the Google security update releases will be familiar with. The buffer overflow works by doing what you might imagine from the name, allowing a memory request to overflow to an adjacent memory with a different allocation tag. MIE with EMTE blocks this kind of exploit and terminates the process at play by the use of those different tags and secrets.

Use-after-free exploits rely on memory that's reused for other purposes – so reallocated by the system – and is protected against as the access request would be using an older tag and so rejected. What's more, Apple told me the new security system specifies that "accessing non-tagged memory from a tagged memory region requires knowing that region's tag, making it significantly harder for attackers to turn out-of-bounds bugs in dynamic tagged memory into a way to sidestep EMTE by directly modifying non-tagged allocations".

But it gets even better. Tag Confidentiality Enforcement, also developed by Apple SEAR, now protects secure allocator implementation from side-channel and speculative-execution attacks

Continued from previous page

thanks to the employment of strict confidentiality requirements. "Our typed allocators and EMTE both rely on confidentiality of kernel data structures from user applications," SEAR explains, "and of the tags chosen by the allocator."

This means that if attackers try to sidestep EMTE by revealing the secrets in question, it's prevented by the use of a Secure Page Table Monitor to provide protection to the kernel allocator backing store, even if there's a kernel compromise at play.

Attacks based on speculative execution, as seen in the infamous SPECTRE threat, exploit how CPUs predict the future execution of instructions following previous, and sometimes long-latent, ones to speed up performance. These are also protected by the use of Apple's enhanced EMTE defences. I'm not going to go into all the details of how this works, just know that it does. If you want to take a deep dive into the world of EMTE and tag values as they impact speculative execution, then head over to the excellent SEAR paper at **tinyurl.com/375sear**.

What I love most about this hugely complex security protection is that it just works, and the user doesn't really need to understand why. That, along with the fact that it was built around solid data across a five-year period from Apple's offensive research team, which is something I can really throw my weight behind.

The team "continuously analysed and attacked the system", both theoretically and practically, to identify the attack strategies that actually pose a threat to users as well as remove them from the risk equation "before attackers could ever discover them". This body of extensive work means that MIE and EMTE protections are available to third-party app developers whose products, and no offence is intended, are often the entry point for those attackers.

"Starting immediately with the launch of MIE," Apple concludes, "any developer can begin testing this powerful protection for their app, including EMTE on hardware that supports it, using the Enhanced Security settings in Xcode."

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STEVE CASSIDY

"There's an opportunity here. That is to get the virtualisation bug early in your planning"

As Windows 10's decade-long reign ends, firms must make big decisions on how to introduce Windows 11. Steve offers a novel suggestion

It's remarkable to note how long a gap there's been between Windows versions. Windows 10 was released in 2015. I don't know how you feel about this but I was more shocked by ten years of Windows 10 than I was to hear that Clint Eastwood is now 95 years old. I'm sorry to say that I have no concrete advice for Mr Eastwood, but I do have a few things to say about Windows 10 and its successors. How should you react to the propaganda, and what should you do to ensure a smooth migration?

First of all, let's agree that there's an ideal number of nice new Windows 11 desktop PCs to buy when beginning a rollout. That ideal number isn't zero, nor is it one per member of staff. Initially, I think a sensible starting point for pretty much every firm is around half a dozen machines. This is because my preferred pathway through an upgrade such as this is certainly not putting one app at a time on the new codebase and then seeing if your Excel macros still work; for one thing, that's an excellent way to eat through many overnight marathons, just reloading the OS on the new machines so that your next app starts from a clean install.

Those half a dozen new PCs are for testing virtualisation as a response to the withdrawal of support for Windows 10. I would expect most 2025 desktop PCs to be able to support anything up to four different VMs at a time, perhaps with a few extra memory sticks and a secondary hard disk. You add the Hyper-V role to the machine build and then pick your favourite machine translator utility. I've become a big fan recently of the StarWind V2V converter (**tinyurl.com/375starwind**). This helps you to move either workstation VMs or full server VMs around the most commonly found formats of VM on-disk structures, which sounds quite enough like miracle-working to me already.

Steve is a consultant who specialises in networks, cloud, HR and upsetting the corporate apple cart
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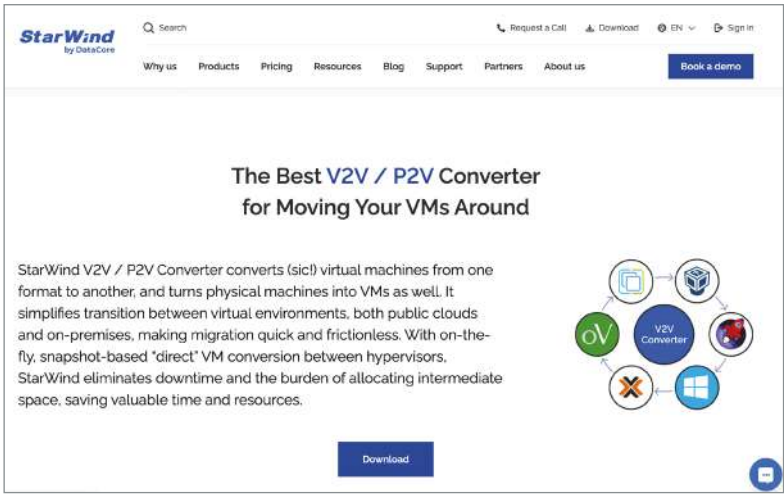
"I have no advice for Clint Eastwood, but I do have things to say about Windows 10"

BELOW If you need to move VMs around machines, take note of StarWind V2V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The Best V2V / P2V Converter
for Moving Your VMs Around
StarWind V2V / P2V Converter converts (sic!) virtual machines from one format to another, and turns physical machines into VMs as well. It simplifies transition between virtual environments, both public clouds and on-premises, making migration quick and frictionless. With on-the-fly, snapshot-based "direct" VM conversion between hypervisors, StarWind eliminates downtime and the burden of allocating intermediate space, saving valuable time and resources.
V2V Converter
Download

However, StarWind is quite coy about this as a product. You have to register to download it, despite the licence being free. Not just free for undersized, marginally useful components or for so many conversion runs: free for any use model. Take a look around the support forums and the decision to be free starts making more sense: StarWind has a long history in virtual machine hacking and presents a perfect case study in that strange business of divergent experiences when tangling with virtualisation. Some of us get the concept and make use of it; others don't and won't. As de-supporting of Windows 10 gets closer, we need to brush up on these skills and technologies.

Are you being served?

There's another opportunity lying in wait here. That is to get the virtualisation bug early in your planning and see what you might be able to do with Microsoft RDP, Citrix, Parallels or VirtualBox, deployed on a server. The managers who were unlucky on their first try with virtualisation will be scrunching up their faces at this, and muttering

"but the server doesn't even have a decent graphics card in it", and "I killed my server host with a poorly chosen print driver and haven't looked back" – but I'm going to give up on the customer is always right approach with them, for a moment.

There are two basic types of virtual server. First, the ones where the Windows sessions share a lot of theoretically read-only components which may safely be shared between users; second, the ones in which the shared code is completely invisible to the user-space apps. Oddly enough, the first kind is more prone to poor compatibility when upgrading either the OS or a single app: the isolation implied by the other type actually improves the chance of one partition not bringing all the others to a halt when it gets a hiccup. This effect is so pronounced that where a client has been a long-term user of RDP virtualisation, I usually suggest they take a clean slate and build up a whole new server when some new bits arrive in an update. Not because I expect every update to be doomed, but more because the recovery time from nuking your live RDP host is going to be anything from three to five working days. The sort of outage that more than pays for some standby hardware, even if it's never turned on.

The idea of virtualising old desktop PCs and hiding them away on a server, against the likelihood of an upgrade rendering it inoperable, is a big pill for IT managers to swallow. This is why my demo server rig to show off how this might work is deliberately small. A Lenovo P300 sits in the hot seat at the moment, with a Synology NAS as an iSCSI target filled up with workstation images in various states of disrepair. The VM settings and configuration definitions are stored in the local drives of the workstation, the drive images are on the NAS disks. The P300 is usefully replete with CPUs with core counts so high they trigger different licence keys to oblige a few more bucks for your bang: in use, this configuration is handily faster than 99% of desktops I've seen, and tends to win IT men over in the interval between clicking "start" in Hyper-V and typing in the VM guest's password to get to the desktop.

No man's land

By now I hope everyone knows about the limits of clear communication when it comes to operating system upgrades. It's pretty poor, is the short verdict. We went a long time in the run-up to Windows 10 in 2015 without much to help us plan the changeover, and if anything that situation has become worse in the tumultuous interlude between 2015 and 2025. I know, there were various streams of information presented through business resellers and major corporates, and a lot of largely empty blether presented to home PC users.

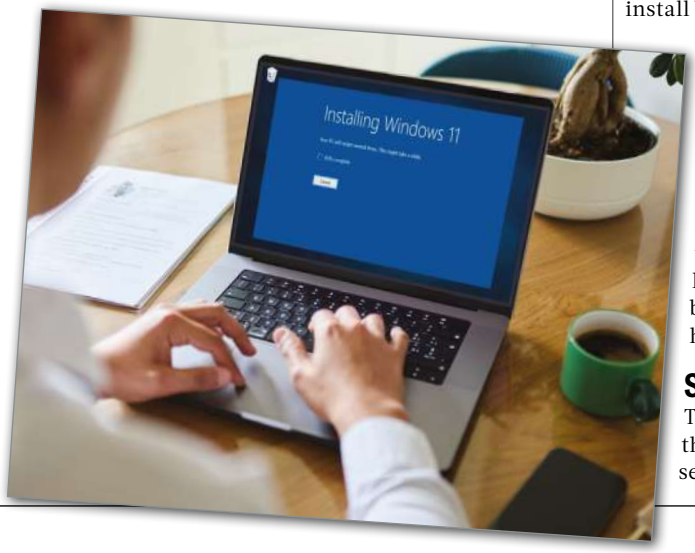
Even though I'm definitely a "home user", I feel very little common ground indeed between my compute environment and that portrayed by Microsoft and its resellers in adverts reminding us about the forthcoming watershed. My advice to home workers and users is this: wait. Historically, every major update in operating systems has always rolled back a few months, sometimes several times, as unexpected issues emerge from that rash and courageous group, the early adopters.

Planning not to do anything for four or six months after the published deadlines is a good way to take things at your own pace and decide what solutions you can implement – or negotiate. There's nothing at all wrong with piling your machines in the boot of the car and getting your IT guys at work to see if they can fix the problem.

Notice how this differs from the outlook inside an office environment. For one thing, it's quite unusual for a home user to spend money on a fix, whereas offices spend money almost too easily. Even this isn't an obstruction to my favourite solution of virtualising everything. Some 15 years down the line there are plenty of free components that function as a professional-grade virtual machine host on home-sized computers.

ABOVE The end of support for Windows 10 is a good excuse to give virtualisation a go

"Unexpected issues emerge from that rash and courageous group, the early adopters"



BELOW Home users shouldn't rush to upgrade their operating systems

However, "virtual confusion" becomes a very real thing when a neophyte comes along and discovers VirtualBox. The cheapest of the free desktop hypervisors is also the biggest of the hypervisors, because it comes in versions for the largest operating system hosts and physical servers you've ever seen. The largest server deployments in the most pitiless, harshly lit data centres are using VirtualBox, too.

Not having room for an IBM Rockhopper Linux mainframe in my data centre, I can't report on the practical differences between desktop size VirtualBox and skyscraper size; what appeals to me about this option is that it's itself a well-behaved and separated app. Put it on a PC, a Mac or the aforementioned Rockhopper box, have a fiddle and then take it off later.

This is a degree of flexibility we've all rather forgotten about, last seen in the final versions of VMware Server for Windows. When a new and massively upgraded install of Exchange came out, server room guys started building new servers as VMs, running on the old Exchange Server and separated from the older install by no more than a couple of IP addresses and some rather hefty partitions on the internal drive arrays. That was back around 2008 or so, and it feels like the lessons readily available from those years have been forgotten. Relearning those approaches will save all of the roles in harm's way in smaller businesses a great deal of hassle – and money.

Saving Firefox

The browser market has seen the slow decline of Firefox for several years now, at least in

terms of percentage points. I've been a Firefox user for sufficiently long that I even tried getting by for a while using the recompiled Apple PowerPC version on my ancient MacBook Pro. Many people were more than puzzled by my persistence, until they see the laptop in question: it's one of only two here with a full-size 17in screen and an IDE SSD. The amps eaten by the lush display are freed up by the drive, and the early version of Photoshop does all I want to pictures taken with the monstrous boat-anchor of an early digital camera that shares a shoulder-bag with the Mac.

So I find myself using the old-timer laptop to occasionally turn out some real work. Naturally this is interrupted by things to do on the web, and if I was reliant on the built-in Safari browser then I'd be out of luck trying to use the majority of everyday websites. No longer supported, can't find certificates, Payment Security errors: the barriers to everyday use are mostly about unsubstantiated accusations of poor security.

I mention the MacBook here because it's very old and therefore an extreme example of this pernicious obsolescence. Lately the same has been true of several of my earlier Windows 10 machines, in particular a cute little 2-in-1 tablet from HP. Errors are popping up both for the security of the browser and for the availability of updates. This is what drove me back to Firefox, because there's no barrier to upgraded features in this browser. It reads your operating system version, of course, and yet the downloaded updates for the browser keep coming even when the updates for the OS have almost dried up.

You can't just grab any old third-party browser download, though. Several well-regarded third-party browser brands are actually built on codebases inherited from standard and bundled-in originals. I had a machine with both Chrome and Microsoft Edge installed: one day along came an update and messed up the separation between the two branded icons on my desktop. Depending on which one I launch first, I get the second launch as a new window of the first – sometimes.

So, if you agree that a divorce between browser security and operating system longevity is a desirable state of affairs, then by all means take a look around the browser world and have a play. Take time to understand what you're using and whether it's separately coded: this means Firefox gets a tick, as does Opera. Just to keep us confused, Opera is based on the Chrome engine, but is so heavily modified that many of the disadvantages of inherited code are directly addressed by the specialist extensions included therein. Even though Firefox has never commanded more than about a third of browser installations, its primary advantage lies in working with its own, background download and update features.

As a lover of the underdog, I'm always pleased when an under-appreciated app gets a new lease of life. Getting on with migrating away from Windows 10 by sidestepping poorly explained obsolescence in web browsers can be an absolute bacon-saver, by letting you refuse to participate in the panicky, throw-it-all-away approach implied by so much of the information provided to mid-sized businesses and their IT suppliers. The first few signs that some user communities aren't going to take this lying down are slowly emerging, as Microsoft begins to show signs of a readiness to continue Windows 10 support for a suitable per-machine levy or other servicing agreement.

Which brings us to a rather more difficult question. We're used to the idea that Windows gives us downloadable programs. It's such a basic idea in computing that it comes as a surprise when we consider how trusting we have been about it for all this time. We know next to nothing about the guys who authored our most often used utilities and, indeed, even highly important apps on which our business relies. Some of them have even passed away during the interval between OS releases. Which makes it kind of awkward if your testing before committing to a rollout uncovers a fault in their code.

My question to you is simple: are you responsible for that unhappy situation, or does the obligation rest with the developer? Clearly some honourable and caring development types take care of this type of issue without charging extra for it. In ideal app user/developer relations, all the users are in a chatroom, as is the app author. There is a certain atmosphere, tinged with forgiveness: nobody's interests are served by flame wars that pop everybody's blood pressure. I've seen a good half a dozen examples of this close-up intimate support model, and it can be an absolute godsend.

When I see a company struggling with a big system-testing exercise, I'm inclined to show them something like Discord and tell them to start their own user-group online, just to get the right guy with the right information to work on the problem. None of us, in 2025, have any business crawling over crash dumps or puzzling through security settings. That is now and ought always to be the responsibility of the guy that wrote the code.

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ABOVE My Windows 10 HP 2-in-1 has been popping up a lot of errors recently

"I'm always pleased when an under-appreciated app gets a new lease of life"

BELOW Opera and Firefox are both great choices of browser on Windows 10

Andy Grove: The man who transformed Intel

David Crookes profiles a man often overlooked when discussing history's most influential people in tech

Molotov cocktails arced through the foggy October air as Red Army tanks made their way down the frozen streets of Budapest. It was October 1956, and the city pulsed with fury. Crowds roared and urged the Soviets to leave, only for their cries to be drowned out by the rattle of machine gun fire.

András Gróf was 20 years old and just starting his second year at the University of Budapest. His young life had been difficult. Mocked as a Jew at school before the Second World War, he'd been forced into hiding with his mother during the Nazi occupation from 1944, avoiding the brownshirts and living in a cellar with other families.

When the war was over, Hungary emerged from the destruction under the USSR's totalitarian sphere of influence, yet life continued to be tough for Gróf and his family. His father, arrested and tortured in a labour camp, had returned only to have his business taken away from him by the Soviet-backed Communist Party. Food and fuel were sparse.

While Gróf grew to enjoy some of the finer things life had to offer, in particular finding a love for literature and opera, problems were never far from the surface. So when the Hungarian Revolution began in 1956, Gróf knew he needed to escape. With his family's backing, he joined 180,000 other Hungarians heading for the border with Austria, while a further 20,000 sought refuge in Yugoslavia.

Crossing the Iron Curtain wasn't easy. There were landmines, watchtowers and spotlights that would flood the ground and pick out refugees desperately trying to avoid detection. To progress, Gróf, accompanied by his best friend, Jancsi, had to move forward with the utmost caution. They walked through a dozen villages and eventually reached an open field with faint lights in the distance. Aware that they were looking at Austria, the pair traipsed forward, their feet sticking in the mud. Then they began to hear dogs barking.

They fell to the ground, face down and held their breath. "Who is there?", a man said in Hungarian. They hesitantly picked themselves up and headed towards the voice. "Relax," the man said. "You're in Austria." Gróf smiled with relief. It was the start of a fresh life and the beginning of a new adventure. Gróf was about to embrace the American capitalist dream.

Early success

After heading for New York City on board a rusty ship, Gróf lived in the Bronx with an uncle and studied chemical engineering at City College. Keen to fit into his adopted country, he also changed his name to Andrew S Grove.

Grove worked hard and graduated from college at the top of his class. He also met his future wife, Eva Kastan, herself a refugee. They married in 1958 and moved to the west coast of the US. Grove enrolled at the University of California, Berkeley, and graduated with a PhD in chemical engineering in 1963.

ABOVE Andy Grove rose to become CEO and chairman of Intel

Images: Intel Corporation

He initially worked as a researcher at Fairchild Semiconductor, rising to become the company's assistant director of development. Having become familiar with the early development of integrated circuits, he wrote the textbook *Physics and Technology of Semiconductor Devices* in 1967. The following year, Grove went to work for Intel, the company founded by Gordon Moore and Robert Noyce, joining on the day of its incorporation.

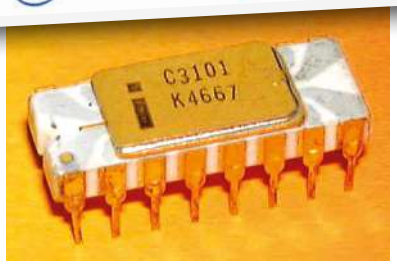
In truth, saying Grove "worked for" Intel is a blatant understatement. He was, in so many ways, the driver of Intel's success – the man who could be credited for the company becoming the world's largest semiconductor manufacturer for many, many years (a position it has since lost). Under his ever-watchful eye, Intel dictated the pace of the computer industry and had the firmest of grips on the market. Grove's approach to business also influenced the likes of Amazon's Jeff Bezos and Apple's Tim Cook.

Yet Grove's prominent role at Intel raised eyebrows – initially, at least. When Noyce and Moore were looking for a director of operations for their newly founded company – a role that involved ensuring products would be designed on time and within budget – no-one would ever have expected Grove to be in the running. He had never overseen a manufacturing process and his background was in physics and academia rather than business management.

But Noyce and Moore saw something compelling: an intelligent, organised man who thought clearly, set objectives and went about his work in an almost Soviet-like manner with discipline, control and a focus on detail. He would prove himself to be a tough operator, unafraid to upset others if it was for the good of the company. There are many stories about the way he operated.

Some of them are detailed in Tim Jackson's excellent book, *Inside Intel*, which charted the rise of the chipmaker in the 20th century. He recounts the time when Ann Bowers, Intel's human resources manager, had to warn Grove's potential secretaries ahead of their interviews that he was an intense perfectionist who didn't mince his words and so wouldn't be easy to work with. Bowers wasn't wrong. Sue McFarland is reported to have discovered how tricky Grove could be after she was offered the job. She was pulled up by Grove for being ten minutes late for work three times in the first week.

But then Grove's penchant for time-keeping was legendary. He introduced a "Late List" in 1971 after becoming infuriated when he saw the car park filling up after 8am, the start time he'd designated for all Intel employees. It didn't matter if people were working well into the evening. Grove wanted everyone in the company at their desk on time in the morning and they had to sign their names upon entering the building if they were late. As you may expect, this led to much resentment.



TOP Andy Grove, left, alongside Robert Noyce (centre) and Gordon Moore (right)

MIDDLE The Intel Inside campaign in 1991 was directly aimed at consumers

ABOVE LEFT Intel's 3101 SRAM was its first product, released only a year after the firm began operations

Intel's impact

Yet it didn't affect Intel – quite the reverse, in fact. The company was doing well, making great strides in the nascent semiconductor memory market. In 1969, it had produced 64-bit Intel 3101 static random-access memory, which was twice as fast as the SRAMs created by rivals. It showed that Intel, despite being only one year old, was capable of creating innovative products in a very short amount of time. A message that was cemented when Intel followed it up with the 1101 SRAM. The company rapidly expanded and created the 1103 dynamic random-access memory (DRAM) integrated circuit the following year.

In 1971, Intel launched a groundbreaking product: the Intel 4004 4-bit CPU, which was the first commercially available general-purpose microprocessor. A print advert in *Electronic News* said it was "a new era of integrated electronics" and so it proved. Intel became a publicly traded company in October 1971 and launched the world's first 8-bit programmable microprocessor, the Intel 8008, in 1972.

Production wasn't always plain sailing and Grove clashed with employees at times, but there was no denying his significant influence over the company.

That's not to diminish the importance of Noyce and Moore. According to Grove, Moore in particular became a "father figure", and the pair spoke often and extensively about the company and its direction. Grove learned from Moore's calm, analytical style. He also learned to read Moore – one furrowed brow and Grove would instantly ask what was bothering him then listen intently to the answer. Moore once told Grove that "one day you'll run Intel", according to *Time* magazine. And that came true.

Throughout the 1970s, Intel continued to produce memory, including the EPROM (erasable programmable read-only memory, invented by Dov Frohman, who had moved to Intel from Fairchild) as well as processors such as the 8080 and the 16-bit 8086. Grove also continued to put his stamp on the company, whether that was through his cleanliness inspections (he believed a tidy desk equalled a tidy mind) or formulas such as McIntel. Grove wanted semiconductor fabrication plants to be as similar as possible, in the same way that McDonald's food is similar across the world.

Grove also steered Intel through a series of challenges, notably from Motorola and Zilog, and he became president of Intel in 1979. Around this time, Grove had implemented a system called Intel Management By Objectives (IMBOS). It was a goal-setting framework also known as

"Grove's approach to business influenced the likes of Amazon's Jeff Bezos and Apple's Tim Cook"

Objectives and Key Results (OKRs) and it was documented in Grove's hugely influential book, *High Output Management*, in 1983. It would become widely read by the movers and shakers of Silicon Valley – Meta's Mark Zuckerberg is known to be a fan.

Key decisions

The book – effectively a crash course in middle-management – looked primarily at how companies can apply production principles to management. It focused on the efforts of teams and how to make them work at their best. Grove deconstructed the importance of one-hour, one-on-one meetings that set agendas and the benefits of performance reviews, while looking at the process and goals of interviews and compensations. It revealed just how much thought Grove put into heading up Intel.

Such clarity of mind was necessary because Intel's place in the industry continued to be challenged, not only internally through the poor reputation of the 80256 – Intel 286 – microprocessor launched in 1982, but by overseas companies such as NEC, Toshiba and Fujitsu in Japan, all of which were making inroads into the microprocessor and memory markets. The DRAM market was of great importance to Intel, accounting for 90% of its sales revenue, but its market share declined dramatically from 82.9% in 1975 to 1.3% four years later.

In 1985, Intel's annual report admitted it had suffered a "miserable year". A business slowdown in 1984 had worsened and there was lower than expected market growth. The company was also still reeling from a widespread brain drain, which had seen top talent leave to create their own firms (Zilog was set up by former Intel employees). What's more, the Intel iAPX 432 – its first 32-bit processor design – was a commercial failure, discontinued in 1986.

Grove knew Intel needed to adapt quickly, more so when 1986 proved to be an even tougher year. It wasn't easy. The company was forced to lay off 7,200 employees, close plants and pull out of the DRAM market. But Grove made some big decisions – decisions that would prove crucial. He ordered Intel to target the PC market and produce microprocessors designed for use in these computers. The company developed the 32-bit 80386, which became known as the Intel 386 and i386, with volume manufacturing starting in 1986.

Intel hoped IBM would use the chip, but the computer maker initially resisted because, concerned about the rising number of clones, it wanted to regain control of the PC market by introducing architecture of its own. To Intel's relief, however, Compaq Computer stepped forward and expressed a desire to produce a machine based around the Intel 386, and this led to other manufacturers wanting to do the same. As a result, Intel's dominance of the microprocessor market grew and Grove became CEO of Intel in 1987 – the year the company became profitable again.

> "Suddenly, it mattered less who made a computer so long as the right chip was powering it"

A new order

Under Grove's leadership, Intel also ceased second-sourcing its microprocessors, which meant only Intel could supply its architecture. In another winning move, Intel began to market directly to consumers rather than to manufacturers. This began in 1989 with the Red X campaign, which proved to be a stroke of genius by the marketing team. Adverts placed in magazines showed a sprayed-out 286 followed on the next page by the number 386 and the sprayed letters "SX". The suggestion was that 286 wasn't enough for computer users. It was telling consumers to look for a computer with a 386SX processor instead. The impact this had was huge.

For years, consumers buying a computer focused, to a great extent, on the manufacturer's badge on a computer's case. Now they were effectively being told to ignore that in favour of the type of chip inside. This message was taken to the next level with the Intel Inside campaign. Launched in 1991, it suggested people look out for a sticker on the machines saying "Intel Inside", which it pushed as a mark of quality. Suddenly, it mattered less who made a computer so long as the right chip was powering it. It put Intel first and foremost in the minds of computer buyers and put Intel firmly in control.

Soon, the PC market effectively became dominated by Intel and Microsoft: Intel providing the chip and Microsoft the operating system. There was a low point in 1994 when a problem with Intel's Pentium chips led to a full recall, costing Intel some $475 million, but Grove remained on top of his brief. Never one to rest on his laurels, he believed it was important to experiment and keep one step ahead of the competition, knowing that inertia would only lead to another company overtaking Intel. Grove's motto became "only the paranoid survive". He published a management book using those words as the title in 1996 and his lesson in leadership quickly spread.

By 1997, *Time* magazine was picking up on Intel's huge success. It said 90% of the 83 million computers sold that year had an Intel chip, and it was so impressed with Grove it made him its Man of the Year – "the person most responsible for the amazing growth in the power and innovative potential of microchips". It was a fitting personal high and a just reward for a leader who had transformed an industry. Grove became Intel's chairman that year.

Yet his time at Intel was winding down. Grove had been diagnosed with prostate cancer a few years before, so he passed the role of CEO to Craig Barrett in 1998, remaining chairman until 2004 then becoming a senior advisor. But his work was done. The Hungarian refugee had helped forge the world's most successful chip company, influenced management style and made himself and a lot of people very rich indeed.

Even so, Grove wasn't quite finished. He funded research into prostate cancer, donated $26 million to the City College of New York, and established the University of California, San Francisco's Mission Bay Campus. When he died on 21 March 2016, aged 79, it felt like his legacy and impact would never be forgotten. While his name isn't so well known today, his is a life worth celebrating.

BELOW ***Time*** **made Andy Grove its Man of the Year in 1997**

BOTTOM **The Compaq Desktop 386 was the first computer to use Intel's 32-bit 80386 microprocessor**

Images: Time USA, LLC. Intel Corporation. Tecnoxarxa, CCO, Wikimedia Commons. Christian Bassow, CC BY-SA 4.0, Wikimedia Commons

Can humanoid robots work?

Nicole Kobie introduces five humanoid robots that want to take our jobs, although only one has succeeded – so far

Robotics demonstrations are always wild: you'll have seen dancing robot dogs, backflipping humanoids and other nightmare-inducing but impressive feats. But the Robbyant R1 just wanted to cook dinner, with its maker Ant Group recently demoing the human-shaped robot assembling a meal of garlic shrimp.

Dig in and even that basic task is less impressive than it sounds. While the robot takes the order, cooks the food and presents it, the prep is all completed beforehand. The Robbyant isn't standing around shelling shrimp or mixing sauces; it merely picks up a small container of ready-made ingredients and dumps it into an appliance sitting on the countertop.

Even that small bit of work happens at a pace so slow you'll be full-on hangry before your meal arrives. Most of the videos on YouTube have actually been sped up – not in obfuscation, but because they'd be long and boring otherwise. One that shows Robbyant's real pace makes for frustrating watching. The robot rolls up holding a white box, taking 17 full seconds to place it down gently onto the countertop and remove its own hands. After another 22 seconds of resetting its arm positions, it manages to pick up a small container – which would presumably hold ingredients but is empty in this video – that it dumps into a blender after another half minute, before slowly pushing a button to start the mixing process. In the background, a man watching the demonstration visibly yawns.

Good luck assembling a lasagne at that pace, mate. It would take years.

This is where we're at with humanoid robots: startups, academics and tech conglomerates alike are leaping over serious hurdles such as natural language and delicate hand movements to achieve impressive improvements in the technology. But the remaining limitations mean such robots aren't yet all that useful. They have found some success in logistics, but by this we mean shuffling boxes.

ABOVE Humanoid robots have found success in logistics – or moving boxes

It's boom time for humanoid robots – even if they aren't doing much more than moving boxes

Here, we examine five humanoid robots from Tesla, Figure, Apptronik, Agility and UBtech. Only one of those is currently a commercial product at work for a paying customer, though plenty of serious trials are happening. Beyond those companies, there are plenty more to consider: Sanctuary AI's Phoenix, Neura Robotics, Unitree Robotics, and even Boston Dynamics, which switched to an electric model a few years back and is now owned by Hyundai Motor Group. That's a handy partner for rolling out droids in car factories.

In short, it's boom times for humanoid robots – even if so far they aren't doing much more than moving boxes from one point to another.

Go Figure

Figure is making robots for work – in factories but also in homes.

The Figure 02, which the company describes as the world's first "commercially viable" autonomous

ABOVE The Figure 02 uses AI to learn – but don't let it near the dishwasher

LEFT Agility claims its Digit is the first commercially deployed humanoid robot

ABOVE We may have to wait a while before we see Tesla's Optimus in the wild

humanoid robot, stands 5ft 6in tall, weighs 70kg, can carry 20kg and work for five hours between charges – a shade longer than its rivals.

But that's the hardware. Figure figures the special sauce is the AI that runs the machine, and its Helix is an AI system that is supposed to be generalist, letting a user give a voice command to the bot and have it figure out how to complete it, even in an entirely new situation.

A video on the Figure website shows a Helix-powered bot sorting packages: first, it picks them up, then it flips them over so the label is facing down for scanning. That's... it. Again, it's not quick at this, gingerly picking up packages before softly placing them on the conveyor belt. Figure admits it is yet to reach human-level dexterity and speed, though that's the goal and it's already cut times from five seconds to just over four, with accuracy increasing from 70% to 95%.

The point isn't that Helix can sort packages tirelessly, but that it can analyse the situation and react – in this case, seeing the packaging and adjusting its "grasp strategy on the fly", Figure says, also noting that it learned to give items in loose plastic bags a little smoothing pat to make it easier to read the label. Other trials include a partnership with BMW.

Figure also believes the Helix system could finally give us robot butlers, with no "special-case engineering, just new data". The robot is shown in a demo video picking up stacked plates and glasses and loading them in order, with Figure saying it can "adjust its strategy to account for messy starting configurations" – by which we presume it means the chaos on your countertops.

The kitchen the Helix-powered bot is cleaning up is already spotless, as are the dishes. It would be interesting to see the Figure 02 tasked with scraping beans off a plate or spotting tea dregs in a cup. And look, everyone has a preference for how to load a dishwasher, but the way it slots in the bowls, they aren't going to get clean.

That said, it's an impressive feat of AI if it truly doesn't require any fresh training. Plus picking up a delicate glass with chunky robot hands is surprisingly difficult. So Figure should get some credit, even if we'll all be loading the dishwasher ourselves for a good long time to come.

To the best of its Agility

Agility describes its Digit as the first commercially deployed humanoid robot. Some would argue with the veracity of that statement – the Pepper bot has been put to work as a guide in airports, hospitals and banks, for example – but the way that Digit is being used is closer to how most of us would imagine a humanoid robot truly working.

Digit robots are powered by Nvidia's purpose-built Jetson AGX Thor robotics computer and managed by a cloud-based system called Arc. This lets the machines be integrated into existing automation and for their workflows to be updated on the fly. So far, Digit only has about a four-hour battery life, though the robots can find their own charging station when needed, like a shuffling Roomba.

Digit is humanoid in that it's bipedal with a pair of hands and a head atop a body. But its knees, for lack of a better descriptor, are bent backwards – if you've ever had the misfortune of watching *The Arrival* starring Charlie Sheen, it's like that.

But don't be scared: Agility is trying to design the opposite of killer robots. Indeed, the aim is to create the first safety rated humanoid robot that's allowed by regulators to work alongside people without being locked in a cage or a work cell that keeps machines and humans apart. So far, that hasn't happened, but Agility wants something called "collaborative safety", which means freeing robots from their work cells and letting them loose in a factory or warehouse.

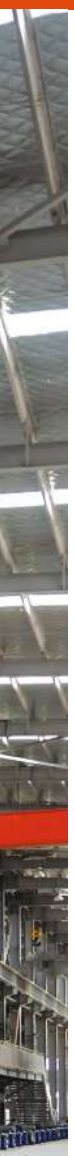
If this all sounds dull and safety-minded compared to the features and specs hyped up by other companies, you're not wrong. While some robotics companies show off their robots doing back flips, Agility's demos tend towards robots hefting boxes around an enclosed space.

Amazon trialled the Digit in 2023, but they are actually being used by GXO Logistics in Georgia, where they move boxes known as totes that hold packages, and at a bearings manufacturing company called Schaeffler in Germany – as well as inside Agility's own factory, of course. If humanoid robots become the future of the workforce, these are the first jobs on their CV.

Tesla Optimus: the one we assume will fail to deliver

Much about Tesla's Optimus raises red flags. The 2021 launch featured dancers rather than tech, after all, and the company has made big promises with little to back them ever since: that includes a price below $20,000 for a "genuinely useful" robot that can do everything from babysitting your kids to mowing the lawn. The plan was to make a few thousand in 2025, with high-scale production by 2026.

As ever with Elon Musk's ventures, the self-imposed deadlines look set to be ignored – but since when has that



mattered? Instead, consider further challenges in Optimus' path. Earlier this year, the senior vice-president in charge of Optimus quit the company, muttering those famous words about wanting to spend more time with his family. Alongside that, reports cite sources claiming delays with supplier parts, as well as problems with the design, saying that while existing prototypes are being used in Tesla workshops to move batteries, they move slower than humans.

But this is Tesla. Frankly, no-one seems to mind if the company misses deadlines or doesn't quite deliver on promises of perfect autonomy; see the troubled Tesla robocar rollout in Austin, Texas, as an example.

If the Optimus does arrive as promised, it will look like a bi-pedal, general-purpose, autonomous humanoid. Demo videos show the shiny-faced gen-2 robot marching stiffly through a Tesla factory, doing squats in a gym, and picking up an egg and gently placing it in a cooker using tactile sensing on its fingers. In another, the robot shovels popcorn into containers – at a decent clip too.

The second version can walk 8km/h and weighs 104lb; the third generation is predicted to reach 12km/h and feature facial recognition, all-day battery life and near-perfect navigation accuracy using LIDAR.

The robots will be powered by the same vision-focused AI that powers the full self-driving technology in Tesla cars, though the company said in an analyst call earlier this year that the training needs for a robot are about ten times as much a car needs to get a useful result.

Will Tesla deliver on Optimus? Given other recent missteps, it's clear that the company has plenty to be getting on with. But it's also clear that real progress has been made since a dancer in a robot suit stepped out on stage five years ago.

Apollo: the one with friends

Picture a humanoid robot, and Apptronik's Apollo is probably what you have in mind: its limbs go the right way, there's something like a face with two dark eyes at the centre, and it looks like a prop from a well-funded sci-fi film.

At 160lb with a height of 5ft 8in, it's properly human sized, too. That said, the modular design means Apollo can be mounted to a stationary platform if it doesn't need legs for mobility. Though the robot has the industry-standard four-hour battery life, it has hot-swappable batteries so it need not be on break during charging stints.

Video demos show the robot creeping along with boxes in hand. Like the Digit, Apollo is designed for logistics and manufacturing, though Apptronik stresses it's a general-purpose machine that "will eventually do millions of things", with the website suggesting construction, oil and gas, home delivery and even "elder care" as future job roles. The aim is for Apollo to work alongside humans, taking on the worst of their tasks, such as lifting heavy objects.

There are a ongoing trials of the Apollo, including one at GXO Logistics, which has already rolled out the Digit – they're clearly keen on robots down in Georgia. Another important pilot is happening at Mercedes-Benz, where the robot has been tasked with delivering parts to production lines and even checking components. What's more, Apptronik has funding from Google, and has partnered with its AI company, DeepMind. American manufacturing giant Jabil is another partner, which will help build the robots and use them in its own operations. It even has a deal with NASA.

Apptronik isn't just betting on humanoid robots, though: this summer it launched spin-off Elevate Robots to create and commercialise designs beyond the human form.

ABOVE **UBtech's Walker is capable of hot-swapping its own battery**

Walker: the one out of China

It's difficult to choose just one Chinese robotics company to profile because the country is going big on humanoid androids, with local stars such as Keenon and EngineAI, as well as long-running robotics firm Unitree unveiling competing designs. They even hold events like robot half-marathons and kick-boxing tournaments to show off progress.

While trials in the West are centred more on logistics and warehousing, those in China are already testing the machine for potential use in nursing homes, for waste management and – reports say – even in the military for combat roles; let's hope that's not true. Already, it feels like China might be winning the humanoid robot race.

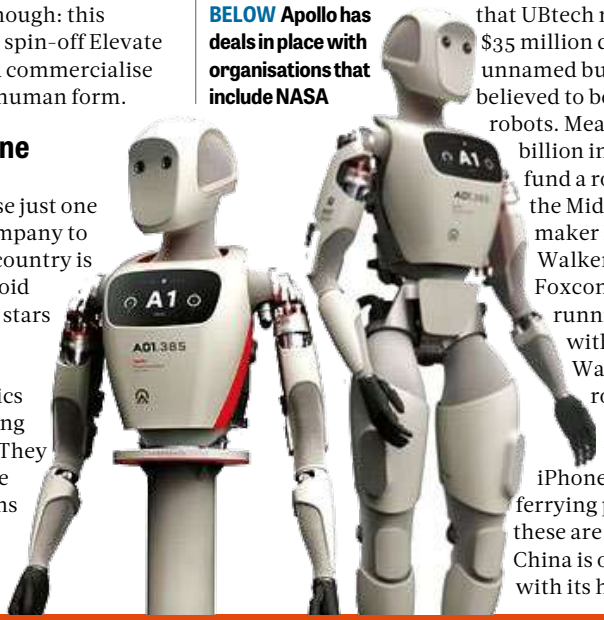
One contender for the crown in China is UBtech, which has a range of humanoid robots including the wheeled Cruzr S2 for customer service, warehouse picking, pharmacies and more. And then there's the Panda robot, which looks like the bear it's named for and is designed for entertainment more than anything else.

But the real centrepiece is the Walker. The S2 model designed for industrial uses weighs in at 70kg and 176cm in height, can walk at 2m/sec, can pick up a 15kg load and uses multiple cameras for human-level depth perception. But forget all that: it can hot-swap its own battery!

Trials in China are testing the machine for potential use in nursing homes and even in the military

Picture a humanoid robot's arms swinging unnaturally behind its body in order to pull out a chunk of its own back, slotting that into a charger, before replacing it with a fresh battery. It's unnerving but unquestionably useful.

Given such skills, it's no surprise that UBtech recently landed a $35 million deal with an unnamed buyer, largely believed to be for Walker S2 robots. Meanwhile, a recent $1 billion investment will help fund a robotics factory in the Middle East. Car-maker BYD is trialling Walker robots, and Foxconn has a long-running partnership with UBtech that has Walker humanoid robots set to be rolled out this year to help make iPhones, even if it is just ferrying parts about. Still, these are all clear signs that China is on to something with its humanoid robots.



BELOW **Apollo has deals in place with organisations that include NASA**

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Thursday 4 December 2025

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Tech firms rival fast-food companies when it comes to marketing disappointment, says Jon Honeyball

There are many things to be disappointed with in modern life. We could start with most politicians. Then move on to those people responsible for rolling out electric car-charging capabilities, especially in blocks of flats and roads with no off-street parking. Or Nextbase, which is still claiming that Roadwatch AI is "coming soon" for its flagship IQ dashcam after almost two years of waiting.

Yesterday, I tried to order Indian food from a local place – friends and I were introducing one of our flock to the wonders of *Thunderbirds* and then a Bond film (*The Spy Who Loved Me*, of course). He had seen neither before, for some inexplicable reason. My local curry house has a website where you can order the food. This looked just what we needed, right up until the point where the "checkout" simply said that it couldn't take card payment through the website, and that I would have to pay cash on delivery. I phoned them up, and repeated the order and then paid by card. What's the point of the ordering system on the website if you can't pay for the dinner? Fortunately what arrived was a significant step up from the usual crushing, and crushed, disappointment that I see elsewhere.

Few things sum up disappointment more than going to a fast food joint. The photography and artwork looks fantastic: plump, filled with crisp lettuce and ripe tomato. A proper bouncy confection that makes your mouth water. Today I was tempted to try a new outfit. What appeared in real life bore little resemblance to the finely polished advert. It was flat, boring, and looked like someone had sat on it. The meat was overcooked and rubbery, the onion flaccid.

Some organisations manage to get things right. I need to renew my driving licence every three years, because I am an insulin-injecting diabetic. It was a few forms to fill out on the website, make a declaration that I hadn't fallen off my perch in the last year and that I promised to keep monitoring my blood sugar levels in an appropriate fashion. That was on a Sunday, and the new driving licence arrived the following Friday. I think we can call this a success.

I wish I could say the same about Transport for London's car payment system. I asked a friend to collect me from London City Airport a few weeks ago. I dropped his car registration onto my TfL account and thought nothing more of it until I discovered that the AutoPay component isn't automatically applied to an additional vehicle, despite it being on the others on the same account. You have to manually set this as additional step. There's still no sign of a fine appearing in the post, but I expect it will come soon.

So you won't be surprised that I'm getting tired of seeing IT products that promise the earth and then leave me with a dejected sigh of disappointment. The Samsung Galaxy Z Fold7 (*see issue 372, p48*) is one such device. The hinge is magnificent, and there is almost no screen trough in the hinge area. Performance is good, the fold-out screen exceptional. However, the battery life sucks. Leave it for two days on my desk and I can guarantee that it will be flatter than that burger top bun. And the placement of the cameras means it can't sit flat on a table, which is surely a primary use case of this device. It was all going so well right up to the point where I actually started to eat it. I mean, "use it on a daily basis".

I still trundle around in a 13-year-old Audi A3, which fits my needs and works well, despite its 125,000 miles. I'd happily join the modern era and get an EV. The Tesla looks good, but I'd forever be disappointed in the "Full Self Driving" it offers in the UK.

They say I can buy FSD for £6,800, and it "includes Enhanced Autopilot, plus Traffic Light and Stop Sign Control. Additionally, in future updates, your vehicle will be able to drive itself almost anywhere with minimal driver intervention." Which is a laughable shadow of what it's offering in the USA, where friends are doing thousands of miles without intervention. Let's face it: "in future updates" clearly means "shut up, give us the money and don't whine", because Tesla has been teasing us with this for years.

> "I'm getting tired of seeing IT products that promise the earth and then leave me with a dejected sigh of disappointment"

There are many reasons not to buy a Tesla, and its spicy leader will be one for many people. For myself, the FSD is just another burger menu option. All the promise, none of the delivery. And that really grates.

Surely there should be regulators to deal with this sort of thing? After all, they've done so well with sewage in rivers, electricity prices and road quality. Maybe I'll just eat this lukewarm burger and floppy fries and console myself that things can't get worse. Can they?

Jon Honeyball is a contributing editor to *PC Pro*. He also includes those responsible for supermarket sandwiches in his list, with the sole exclusion of M&S for its prawn offering.

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